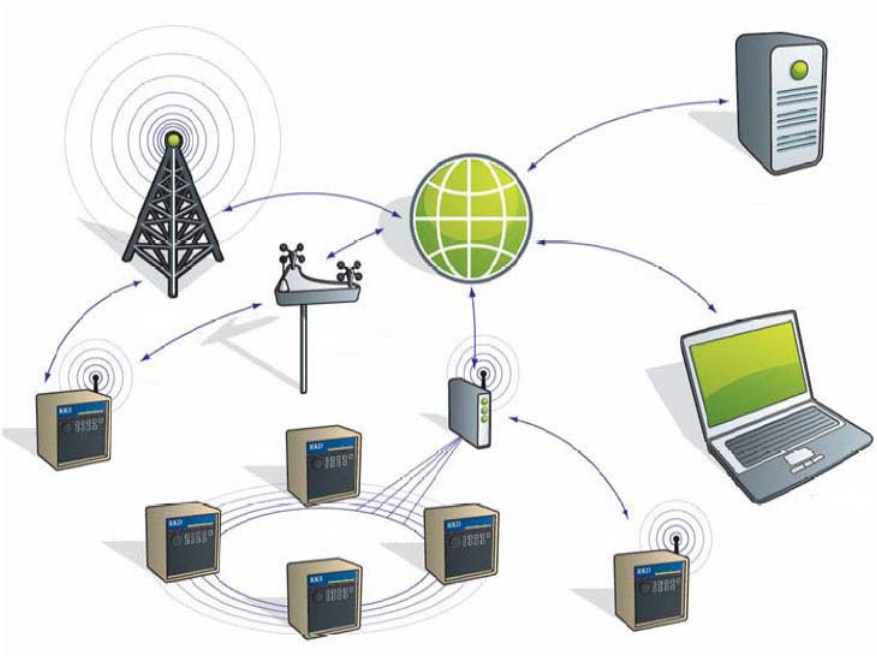

Tucor Cycle Manager

User Manual

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Table of Contents

About this Manual

This manual describes the basic use of Tucor Cycle Manager and its tools for scheduling, maintaining and monitoring your irrigation systems via the web.

Target groups are both end users and service personnel. Certain functions are exclusively to be carried out by service personnel. These functions will be highlighted in the text.

Structure of the Manual

The manual is structured as follows:

- Chapter 1: Introducing Cycle Manager
- Chapter 2: Getting Started with Cycle Manager
- Chapter 3: The Cycle Manager Dashboard
- Chapter 4: Managing Programs
- Chapter 5: Managing Stations
- Chapter 6: Managing Sensors
- Chapter 7: Managing Flow Settings
- Chapter 8: Managing ET and Moisture
- Chapter 9: Managing Weather Stations
- Chapter 10: Data Monitoring

Chapter 1:
Introducing Cycle Manager

In this chapter:

- Introducing Cycle Manager
- The Cycle Manager Opening Window
- Navigating the Cycle Manager Interface
- Cycle Manager – How It Works

Introducing Cycle Manager

Tucor's Total Cycle Management concept of irrigation scheduling has been developed for easy web-based management of your irrigation system. With Cycle Manager you can manage flow, adjust programs, track alarms, review the entire network to spot leaks, breaks or plugged nozzles from any web-enabled PC or laptop.

Total Cycle Management integrates Tucor controllers with ET devices and soil moisture sensors ensuring timely access to accurate irrigation.

With Cycle Manager you'll have remote access to:

- Programs (10 available)
- Individual stations (up to 100)
- Sensor setup (Rain, etc.)
- Flow rates and alarms (when using a flow sensor)
- ET data (when using a suitable ET input)

Other key features:

- Printouts of the system can provide you with hard-copy data.
- Extensive monitoring information confirms water savings and usage to the pertinent authorities.
- Alarms can be sent by email, notifying you of undesirable situations, which can be verified on-line and often resolved without anyone even having to visit the site.

Note: The controller's data is stored on a web server, so should some catastrophe or unwanted changes occur, you can easily return to the controller's original system state.

Figure 1: A typical Cycle Manager work space.

The Cycle Manager Opening Window

Once you log on to Cycle Manager using a web browser, the opening window appears, displaying the available devices for your site.

Devices in this connection are either *controllers*, *controllers with weather stations* or *stand-alone weather stations*. From this window, you connect to the device you wish to monitor and manage.

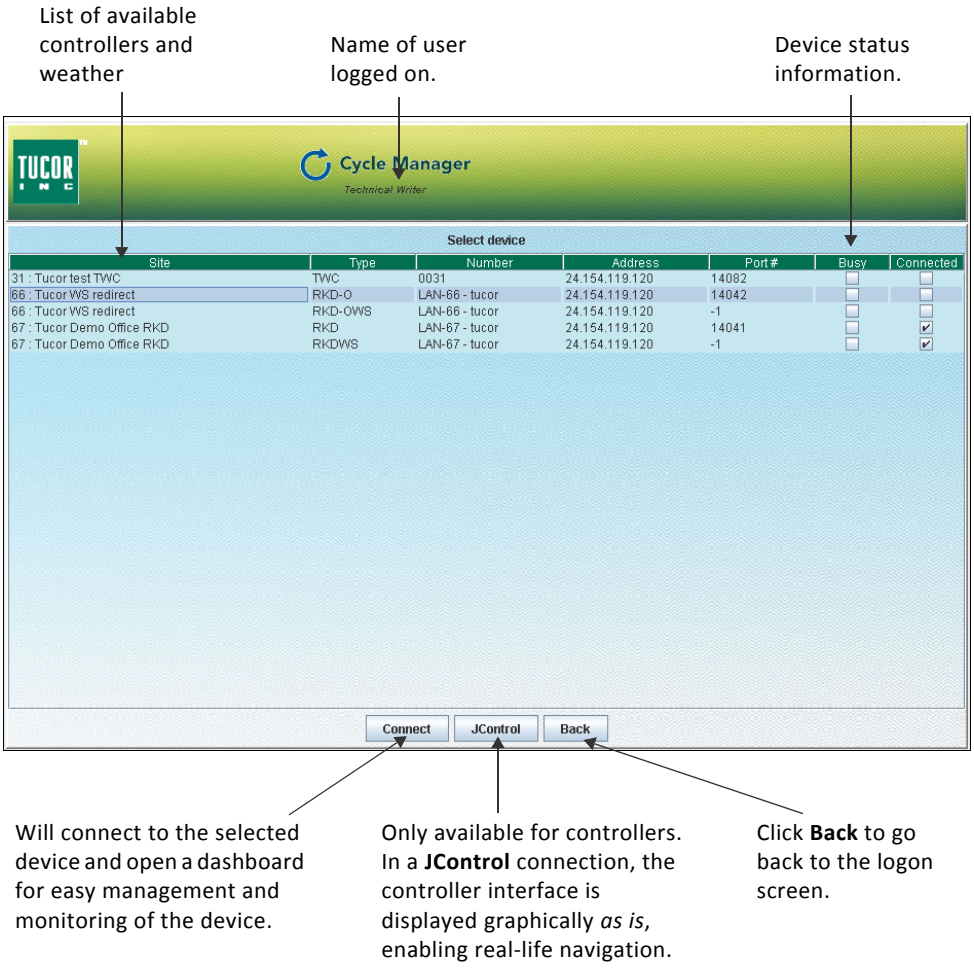


Figure 2: The Cycle Manager opening window.

In the Cycle Manager opening window, each device is represented by name, type and address information. Also, you can see whether your devices are currently connected to the server or not.

Note: Devices are set up for Cycle Manager by Tucor in coordination with key personnel at the client. End-users are not able to edit information in the opening window.

For each device the following information appears:

Site A unique name identifying the site. The site name is determined by Tucor and the client. For instance, the site name may indicate an area or the name of a building. This information can be useful to service people when troubleshooting.

Type Indicates the type of device. Options are:

- **RKS** – a stand-alone, conventional controller designed for converting conventional systems to Tucor's remote management system.
- **RKD** – a stand-alone, decoder-based, 2-wire controller.
- **RKS WS** – an RKS controller used in combination with a standard weather station.
- **RKD WS** – an RKD controller used in combination with a standard weather station.

Type (cont)

- **GTC-S** – a GreenTech stand-alone, conventional controller designed for converting conventional systems to GreenTechs's remote management system.
- **GTC-D** – a GreenTech stand-alone, decoder-based, 2-wire controller.
- **GTC-S WS** – a GTC-S controller, used in combination with a standard weather station.
- **GTC-D WS** – a GTC-D controller, used in combination with a standard weather station.
- **Davis WS** – a Davis weather station connected directly to the server enabling serial communication. Both GPRS and LAN are supported.
- **Irrisoft** – a centralized Irrisoft weather station which enables transfer and distribution of advanced weather data.
- TWC – {Tucor - description outstanding}
- TWC Web – {Tucor - description outstanding}
- TWC AG – {Tucor - description outstanding}
- AIC – {Greentech - description outstanding}

Number A unique, non-editable site number. If the current device is a GPRS device, the field holds the phone number of the device. In case the device is a LAN device, the field holds a unique number.

Address The IP-address of the current device.

Port The port number of the current device.

Busy Indicates whether the device is busy or not. A checkmark indicates that another user is currently working with the device. You are not able to connect to a device if it is busy, i.e. only *one* user is allowed to work with a device at a time.

Connected Indicates that the server is connected and is communicating with the device.

In case the connection is lost, the word '*Disconnected*' appears at the top of the window.

Even if the connection to the controller is lost, you can still continue to work with your programs in Cycle Manager. Once you have finished editing, save your work, return to the **Select Device** window by clicking **DIRECTORY**, and restore the connection by clicking **Connect**.

Navigating the Cycle Manager Interface

Below is an overview of the basic navigation options in the Cycle Manager interface. The screenshot is from the PROGRAMS area.

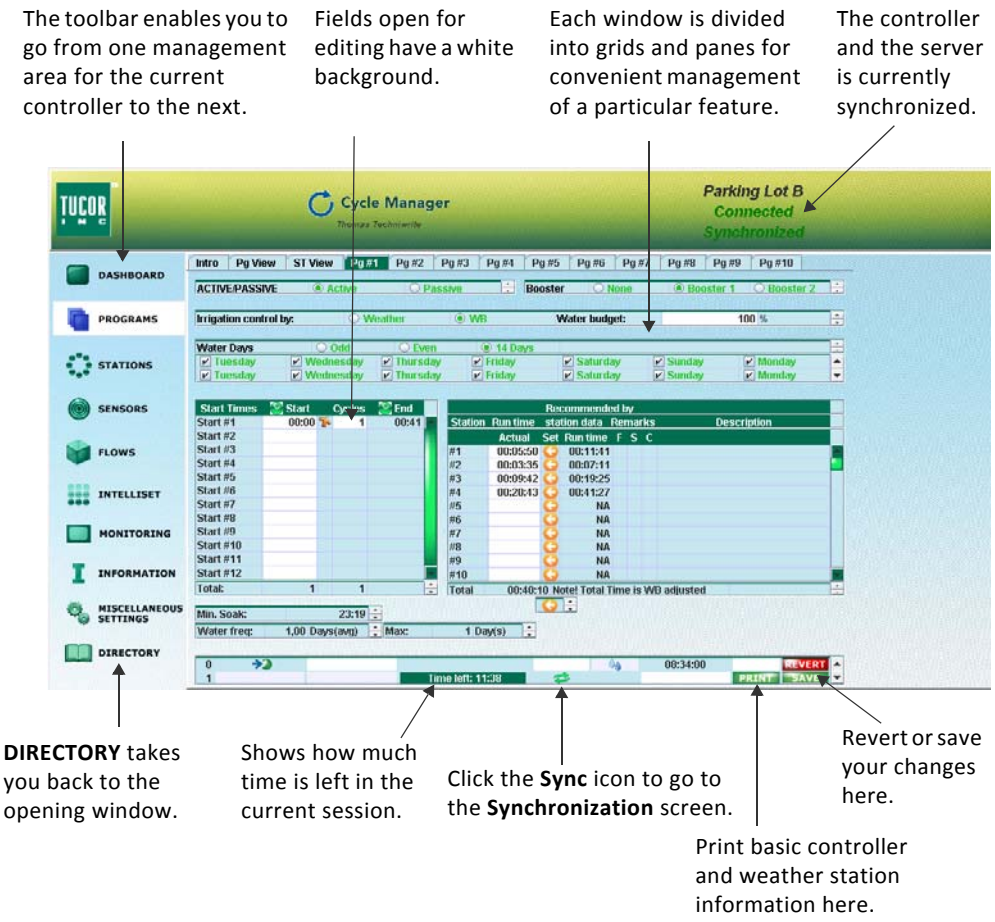


Figure 3: Basic navigation in the Cycle Manager Web interface.

Important! When your screen has been idle for 10 minutes, Cycle Manager displays a timeout-notification indicating that 2 minutes of your session remains. You prolong your session by clicking **Extend** in the dialog box. Alternatively, click **Save** or **Revert** – or navigate to another Cycle Manager area.

Using the JControl Feature

Controllers may be managed using the so-called *JControl* feature, which will display the controller interface graphically *as is* enabling real-life navigation using the mouse.

To access a controller, click **JControl** in the Cycle Manager opening window.

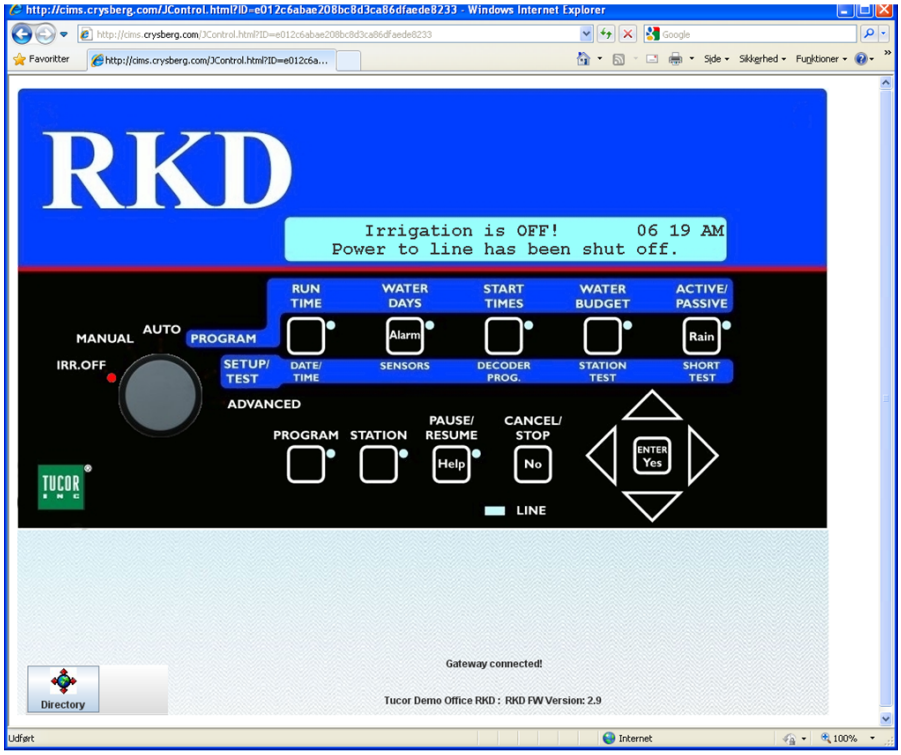


Figure 4: Controllers may be managed real-life using the JControl feature.

Cycle Manager – How It Works

The figure below depicts how a laptop logged on to the Cycle Manager server interacts via the web with controllers and ET devices in an irrigation system. As seen, the web connection may be either wireless or by cable.

Setting up programs and making adjustments can be done either from Cycle Manager on the server-side – or in the field at the controller. Thus, if you or your service personnel find it more convenient to perform changes directly at the controller you can to do so, and subsequently update the server via Cycle Manager to make the changes active.

Cycle Manager will keep track of all changes made on either side and enable you to take action in case one or more potential conflicts exists.

Changes are implemented *real-time*. So if you need to react fast to changes in irrigation demands, log on Cycle Manager, make the changes and have them implemented within the hour.

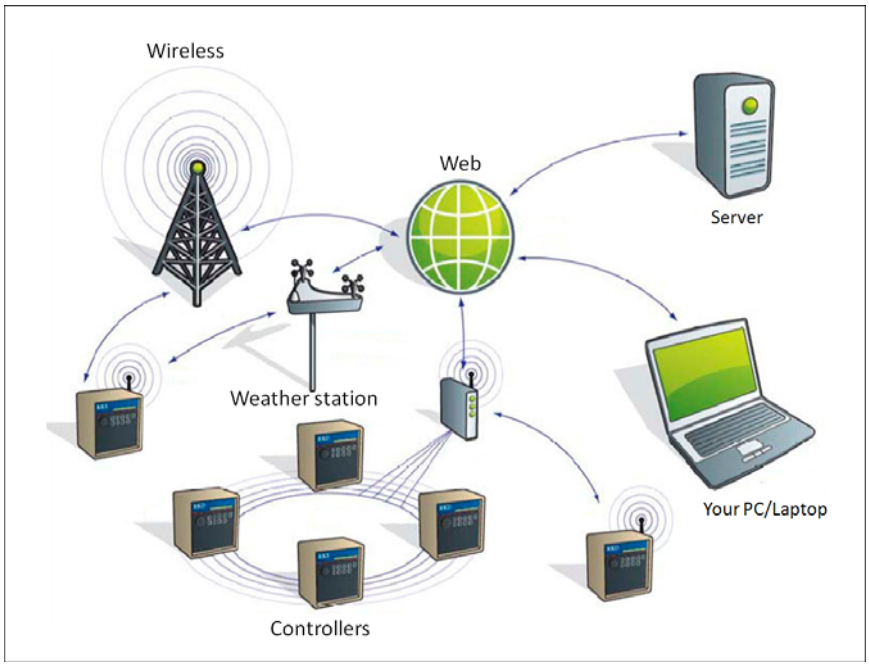


Figure 5: Overall flowchart of Tucor's *Total Cycle Management*.

Principles of Synchronization

To have Cycle Manager run your irrigation system correctly, you need to make sure that the server has the most recent data at all time. To ensure this, you need to *synchronize data*, whenever you have completed a round of changes. This applies regardless of *where* and *how* you have made the changes: Using Cycle Manager or directly at the controller.

During a synchronizaton, the most recent data are transferred to the chosen device – either the Cycle Manager server or to the controller – enabling that device to irrigate your site as intended.

Cycle Manager constantly keeps track of what data changes are the most recent and on what device they are stored: At the server or at the controller.

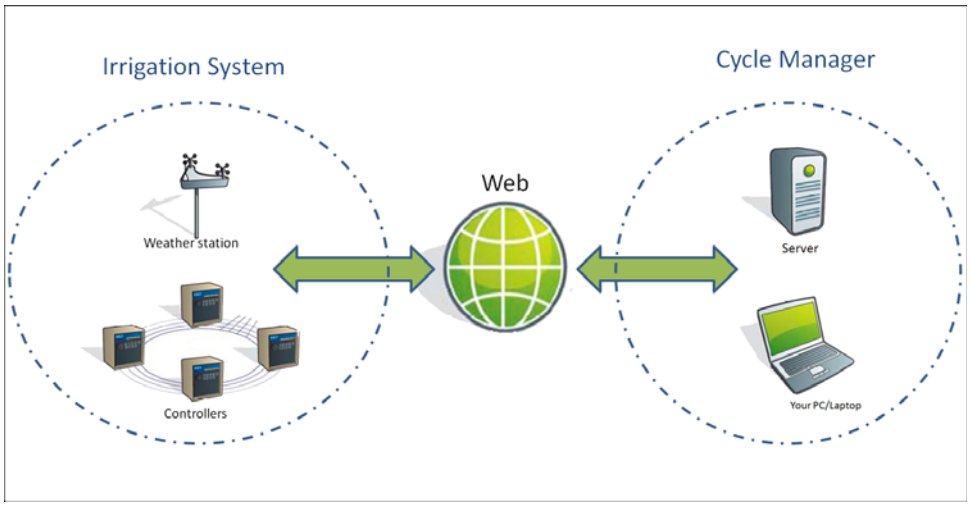


Figure 6: Data synchronization between Cycle Manager and controllers will ensure that your irrigation system uses the most recent data.

Important! Always make sure that the internal clock at the controller shows the correct time. If not, the controller will deliver wrong timestamps.

Synchronization is based on *timestamps*. Each time you save your changes either at the controller or at the server, a timestamp will be stored showing the year, date and time for that particular change. When you click **Connect** in the opening window, Cycle Manager will request timestamps from both the server and the controller.

If the timestamp associated with a particular type of data on the server does not match the timestamp of the same type of data on the controller, or vice versa, a *NOT Synchronized* message is displayed at the top of the Cycle Manager window. This message indicates that synchronization is needed.

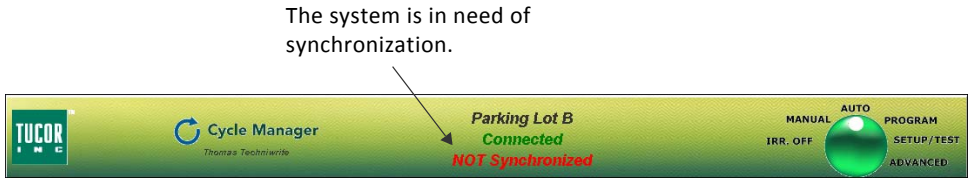


Figure 7: Look for the *NOT Synchronized* message.

Important! Make sure to coordinate your work in Cycle Manager with personnel in the field. The timestamps associated with changes you make in Cycle Manager will conflict with timestamps of similar changes made at the controller and vice versa. For more information turn to **In Case of Conflict** on page **23**.

If more people are involved in maintaining your irrigation system, make sure to keep track of what changes they make and where. Coordination is the key. If for instance one person makes station changes in the field and another make similar changes in Cycle Manager, you need to know what changes are valid before you synchronize.

How to Synchronize

When you are ready to synchronize, click the **Sync** icon next to the countdown timer in any window. This opens the **Synchronization** window.

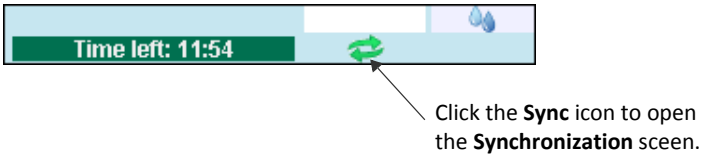


Figure 8: The first step of a data synchronization.

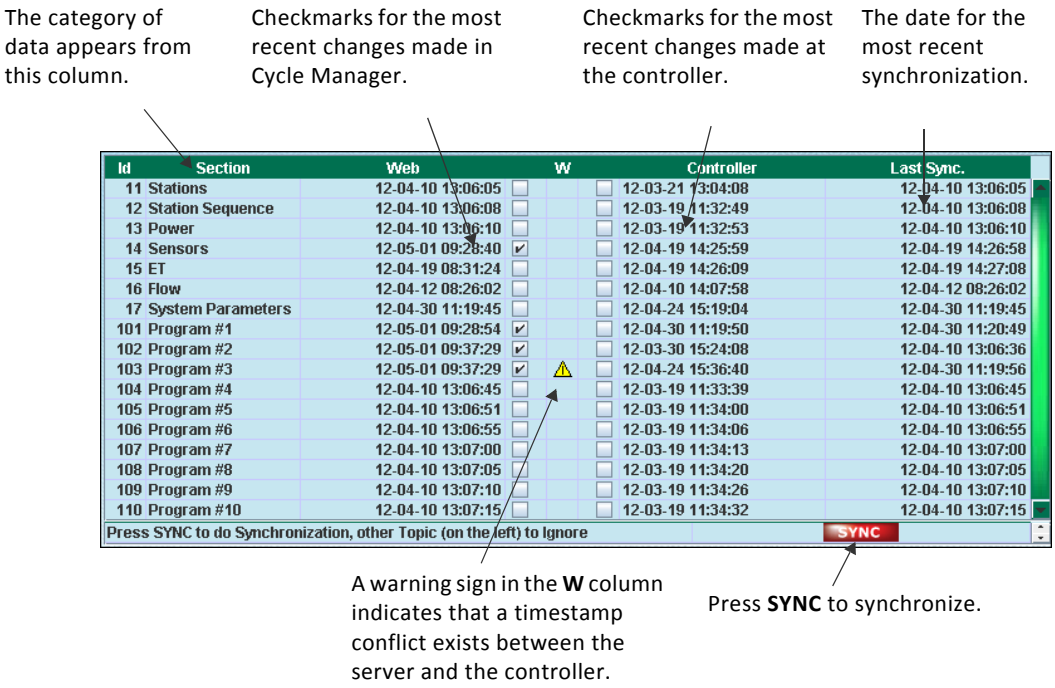


Figure 9: In the **Synchronization** window, verify the changes and press **SYNC** to synchronize.

In the **Synchronization** window, checkboxes are checked for those categories of data that have been subject to change since the last synchronization. In case you want to discard a change, remove the associated checkmark by clicking it with the mouse.

Once you have verified that checkmarks reflect the changes you want to implement, click the **SYNC** button to start the synchronization. This will transfer the data to the selected side, the Cycle Manager server or the controller.

The process takes anywhere from a few seconds to a couple of minutes depending on the speed of your Internet connection.

Note: In case you do no want to synchronize at this point, simply navigate to another area in Cycle Manager. The phrase *Not Synchronized* will remain at the top of the Cycle Manager window to remind you that synchronization is needed.

What Type of Data Will Be Synchronized

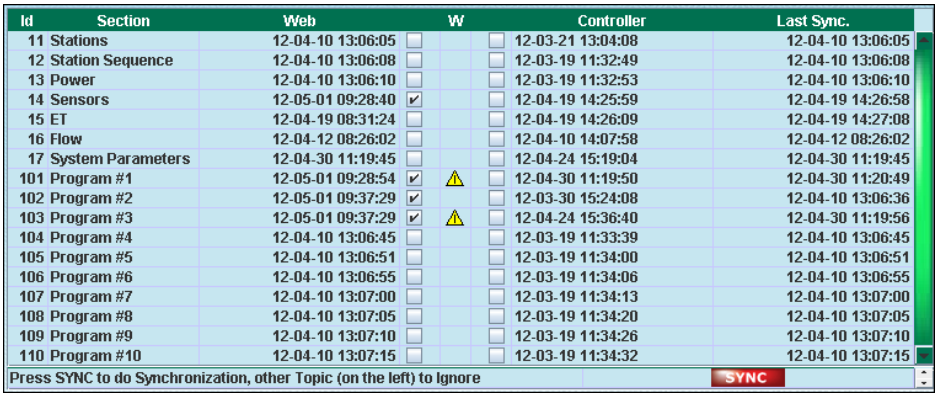
In the **Synchronization** window the following categories of data are available from the **Section** column.

Stations	A checkmark in this row reflects one or more changes made to any of the up to 100 stations in the irrigation system.
Station Sequence	In most cases a checkmark in this row is only relevant on the controller-side. During synchronization, the station sequence settings will be transferred from the controller to the Cycle Manager server and be stored for backup purposes. In case the controller breaks down you can restore the settings by synchronizing from the server to the new controller.
Power	Mostly relevant for the controller-side. See **Station Sequence** above.

Sensors	A checkmark in this row reflects one or more changes to made to one or more sensors in the irrigation system (rain sensors, flow sensors, etc.)
ET	A checkmark in this row reflects one or more changes to made to ET settings.
System Parameters	Mostly relevant for the controller-side. See **Station Sequence** above.
Program1 – Program10	A checkmark in this row reflects one or more changes made to any of the up to 10 programs in the irrigation system.

In Case of Conflict

If timestamps shows that the same type of data has been changed on both the server and at the controller, Cycle Manager will insert a checkmark at the most recent change and place a warning triangle in the **W** column. In this case, you need to consider carefully what change should be implemented the other.



Id	Section	Web	W	Controller	Last Sync.
11	Stations	12-04-10 13:06:05		12-03-21 13:04:08	12-04-10 13:06:05
12	Station Sequence	12-04-10 13:06:08		12-03-19 11:32:49	12-04-10 13:06:08
13	Power	12-04-10 13:06:10		12-03-19 11:32:53	12-04-10 13:06:10
14	Sensors	12-05-01 09:28:40		12-04-19 14:25:59	12-04-19 14:26:58
15	ET	12-04-19 08:31:24		12-04-19 14:26:09	12-04-19 14:27:08
16	Flow	12-04-12 08:26:02		12-04-10 14:07:58	12-04-12 08:26:02
17	System Parameters	12-04-30 11:19:45		12-04-24 15:19:04	12-04-30 11:19:45
101	Program #1	12-05-01 09:28:54	⚠	12-04-30 11:19:50	12-04-30 11:20:49
102	Program #2	12-05-01 09:37:29		12-03-30 15:24:08	12-04-10 13:06:36
103	Program #3	12-05-01 09:37:29	⚠	12-04-24 15:36:40	12-04-30 11:19:56
104	Program #4	12-04-10 13:06:45		12-03-19 11:33:39	12-04-10 13:06:45
105	Program #5	12-04-10 13:06:51		12-03-19 11:34:00	12-04-10 13:06:51
106	Program #6	12-04-10 13:06:55		12-03-19 11:34:06	12-04-10 13:06:55
107	Program #7	12-04-10 13:07:00		12-03-19 11:34:13	12-04-10 13:07:00
108	Program #8	12-04-10 13:07:05		12-03-19 11:34:20	12-04-10 13:07:05
109	Program #9	12-04-10 13:07:10		12-03-19 11:34:26	12-04-10 13:07:10
110	Program #10	12-04-10 13:07:15		12-03-19 11:34:32	12-04-10 13:07:15

Press SYNC to do Synchronization, other Topic (on the left) to Ignore SYNC

Figure 10: Two warnings indicate a possible conflict.

HINT! You do not necessarily have to finish your work in Cycle Manager on the same day. As long as you have saved your work, you can log off the system and return later. It is only when you synchronize data that your work is done.

Chapter 2:

Getting Started with Cycle Manager

In this chapter:

- Setting Up a Controller for the First Time
- Defining the Basic Settings

Setting Up a Controller for the First Time

When set up a controller for the first time, three alternative approaches are possible:

- Importing existing data from the controller to Cycle Manager.
- Entering new program information in Cycle Manager and then synchronize it with the empty controller.
- A combination of the two.

Your choise of method depends on several factors (not neccesarily excluded to the following):

- If you are retrofitting an old system you may want to start out by importing data form the controller and then adjust it in Cycle Manager.
- If you are setting up a new irrigation system, and the controllers are not yet ready for physical installation, you can save time by entering irrigation information in Cycle Manager and then transfer the data to the controller once it has been installed.
- If you are upgrading or expanding an existing site with new controllers you may want to combine the to approaches.

Re-using Controller Information

In case the controller has already been physically installed and set up with program and station information, you have to perform a synchronization of data going from the controller to Cycle Manager.

How to do this:

1. Log on to Cycle Manager.
2. Select the controller in the opening window, and click **Connect**. Cycle Manager opens. Notice the phrase **NOT Synchronized** appears at the top right corner of the Cycle Manager opening window.

3 Click the **Sync** icon to open the **Synchronization** screen.

4 Verify that all relevant sections have checkmarks in the **Controller** column.

5 Click the red **SYNC** button.

6 All data will be transferred from the controller to Cycle Manager.

7 Once controller data have been imported, you can proceed to the other areas in Cycle Manager and make any neccessary adjustements. For more information turn to **Defining the Basic Settings** on page **29** and the subsequent chapters. Save your work as you move from one area in Cycle Manager to the next.

8 Remember to synchronize with the controller when your work is complete.

Setting up information Cycle Manager

In this scenario, you have all the program and station information available but the physical controller has not yet been installed. In order to save time, you may want to start out in Cycle Manager by setting up the programs, and then synchronize with the controller once it has been installed.

How to do this:

1 Log on to Cycle Manager.

2 Select the controller in the opening window, and click **Connect**. Cycle Manager opens.

3 Since the controller is not yet physically installed, the phrase *Not Connected* will appear across the top of the screen.

4 Proceed to the various areas in Cycle Manager to set up relevant data. For more information turn to **Defining the Basic Settings** on page **29** and the subsequent chapters. Save your work as you move from one area in Cycle Manager to the next.

5 When your work is complete, click the **Sync** icon to open the **Synchronization** screen.

Id	Section	Web	W	Controller	Last Sync.
11	Stations	12-04-10 13:06:05	☐	12-03-21 13:04:08	12-04-10 13:06:05
12	Station Sequence	12-04-10 13:06:08	☐	12-03-19 11:32:49	12-04-10 13:06:08
13	Power	12-04-10 13:06:10	☐	12-03-19 11:32:53	12-04-10 13:06:10
14	Sensors	12-05-01 09:28:40	☑	12-04-19 14:25:59	12-04-19 14:26:58
15	ET	12-04-19 08:31:24	☐	12-04-19 14:26:09	12-04-19 14:27:08
16	Flow	12-04-12 08:26:02	☐	12-04-10 14:07:58	12-04-12 08:26:02
17	System Parameters	12-04-30 11:19:45	☐	12-04-24 15:19:04	12-04-30 11:19:45
101	Program #1	12-05-01 09:28:54	☑	12-04-30 11:19:50	12-04-30 11:20:49
102	Program #2	12-05-01 09:37:29	☑	12-03-30 15:24:08	12-04-10 13:06:36
103	Program #3	12-05-01 09:37:29	☑	12-04-24 15:36:40	12-04-30 11:19:56
104	Program #4	12-04-10 13:06:45	☑	12-03-19 11:33:39	12-04-10 13:06:45
105	Program #5	12-04-10 13:06:51	☑	12-03-19 11:34:00	12-04-10 13:06:51
106	Program #6	12-04-10 13:06:55	☑	12-03-19 11:34:06	12-04-10 13:06:55
107	Program #7	12-04-10 13:07:00	☑	12-03-19 11:34:13	12-04-10 13:07:00
108	Program #8	12-04-10 13:07:05	☑	12-03-19 11:34:20	12-04-10 13:07:05
109	Program #9	12-04-10 13:07:10	☑	12-03-19 11:34:26	12-04-10 13:07:10
110	Program #10	12-04-10 13:07:15	☑	12-03-19 11:34:32	12-04-10 13:07:15

Press SYNC to do Synchronization, other Topic (on the left) to Ignore SYNC

6 Verify that all relevant sections have checkmarks in the **Web** column.

7 Click the red **SYNC** button.

8 All data will be transferred from Cycle Manager to the controller.

Defining the Basic Settings

Regardless of the starting point for your work with a new controller in Cycle Manager, you must make some initial selections and define some basic settings for your site. This is done in the MISCELLANEOUS SETTINGS area.

Note that the settings can be changed at a later stage as the requirements for your irrigation systems change.

The basic settings fall in the following catagories:

- Choosing the overall irrigation principle
- Enabling/disabling moisture setup
- Enabling/disabling cycle and soak
- Enabling/disabling recommended runtime
- Enabling/disabling advanced ET setup
- Enabling/disabling controller monitoring

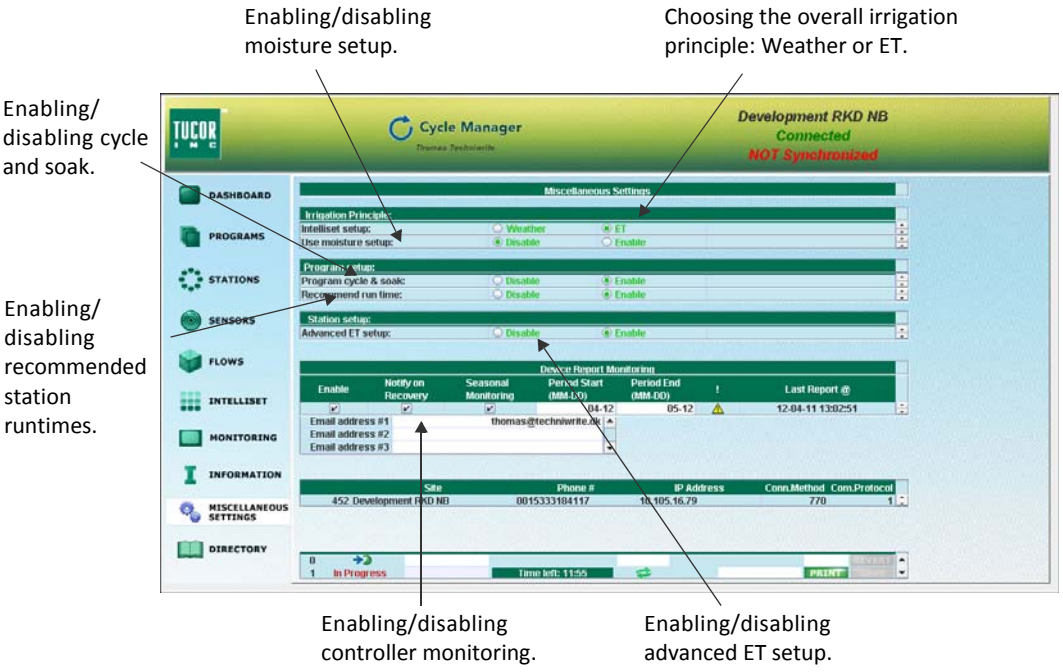


Figure 11: Defining the basic settings in the MISCELLANEOUS SETTINGS area.

Basic Settings Flowchart

The flowchart below depicts the consequences of enabling/disabling the various basic settings. The left side of the workflow shows an ET based irrigation principle, the right side a weather based irrigation principle.

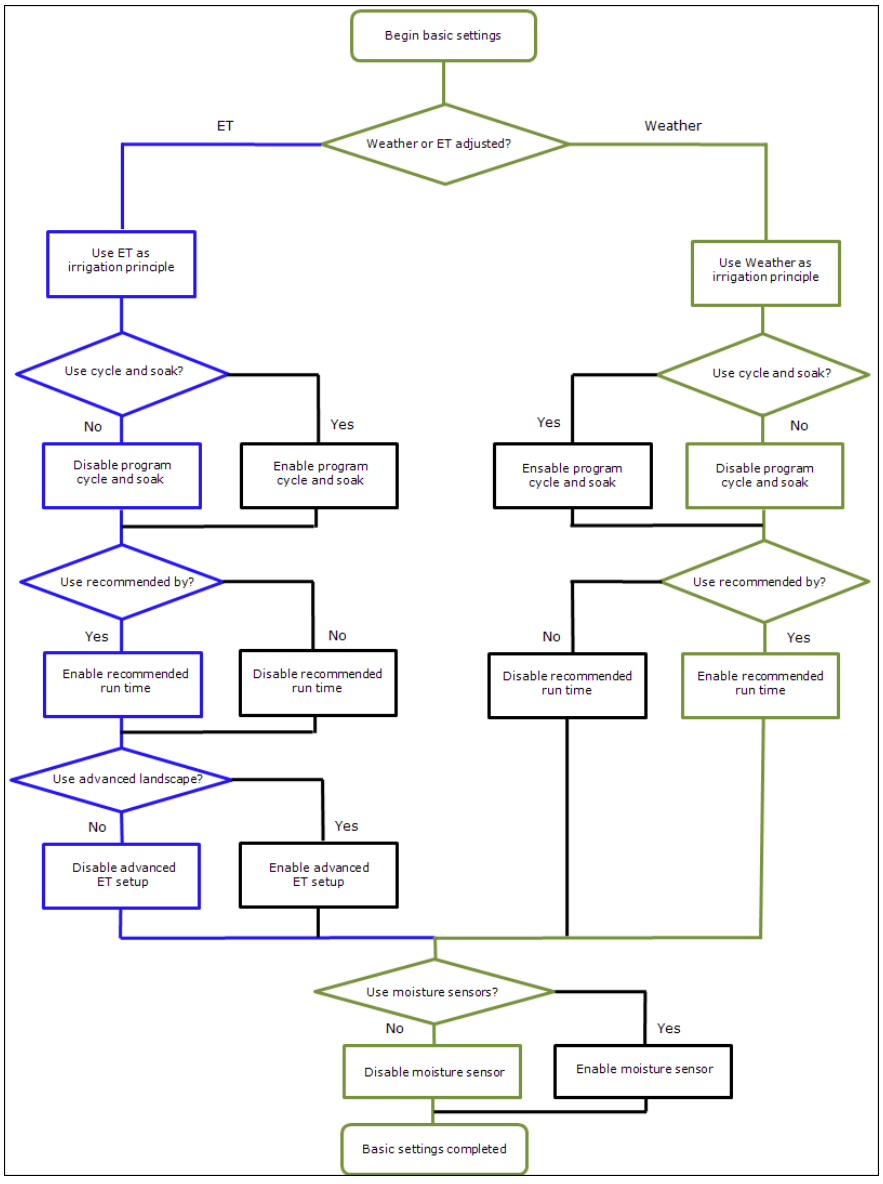


Figure 12: Basic settings flowchart. Thomas

Choosing the Overall Irrigation Principle

Two basic irrigation principles are available: Weather adjusted and ET adjusted.

- **Weather adjusted** is recommmended for sites with less complex irrigation needs. For instance, when retrofitting older systems where the client is quite happy with the current irrigation. Weather adjusted may be regarded as the quick and easy way to get a system up an running in Cycle Manager without too many selections to be made. The system continues to use historic ET or a weather station to regulate irrigation, for instance based on a water budget.

  If the requirements for the site should change, you can always move from Weather adjusted to ET adjusted irrigation.

- **ET adjusted** is typically the choice for new installations and/or for clients who wish to deploy an irrigation system that intelligently saves water by using the many opportunities in ET regulated irrigation. Rather than just using historic ET or a weather station, you may use Cycle Manager to finetune irrigation to adjust for different plant types and soil types, as well as varying geographical and weather conditions.

  Also, enabling ET adjusted irrigation on this level makes it possible to enable *advanced ET setup* for each of stations individually. For more information turn to **Enabling/Disabling Advanced ET Setup** on page **33**.

  For more information on how to work with ET settings in Cycle Manager, turn to Chapter 8: Managing ET and Moisture.

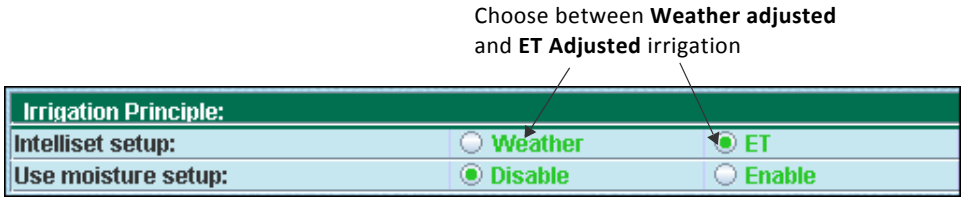


Figure 13: Setting the overall irrigation principle.

Enabling/Disabling Moisture Setup

To enable moisture setup, select the **Enable** radio button next to *Use moisture setup* in the *Irrigation Principle* grid.

When moisture setup is enabled, the **Moisture Setup** tab becomes available in the INTELLISET area.

For more information on moisture setup, turn to Chapter 8: Managing ET and Moisture.

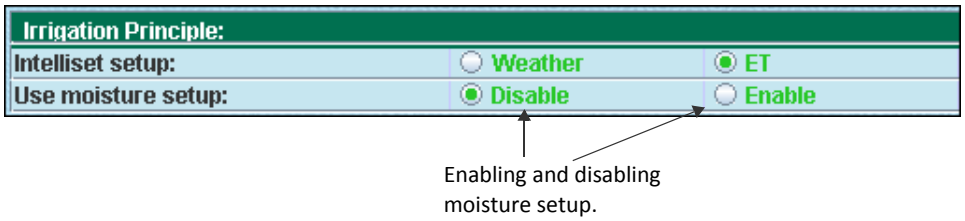


Figure 14: Select the **Disable** radio button to disable moisture setup.

Enabling/Disabling Cycle and Soak

To activate cycle and soak irrigation, select the **Enable** radio button next to **Program Cycle and Soak** in the *Program setup* grid. Cycle Manager then makes it possible to set values for cycles and end times for each program in the irrigation system. These settings are available on the **Programs** tab in the PROGRAMS area.

For more information on working with cycle and soak, turn to Chapter 4: Managing Programs.

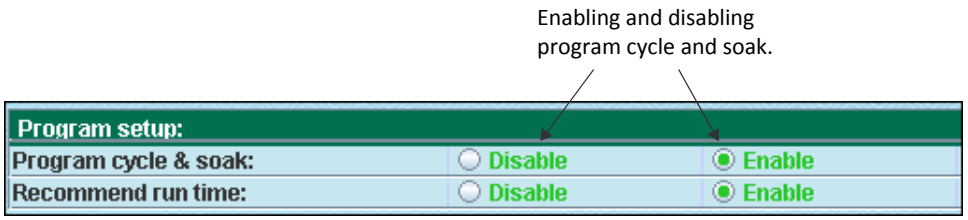


Figure 15: Select the **Enable** radio button to enable cycle and soak irrigation.

Enable/Disable Recommended Run Times

When you enable **Recommend run time** in the *Program setup* grid, Cycle Manager will make sure to calculate recommended run times for your stations. The runtimes willl appear in the *Recommended by* area on the **Programs** tab in the PROGRAMS area.

The actual recommended run time figure is calculated from the station setup in combination with the programs irrigation control by water days, start times and cycles.

For more information on recommended runtimes, turn to Chapter 4: Managing Programs.

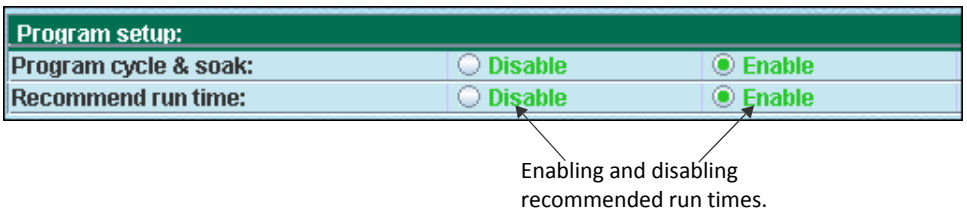


Figure 16: Select the **Enable** radio button to enable Cycle Manager to calculate recommended run times.

Enabling/Disabling Advanced ET Setup

If you set **ET adjusted** as your main irrigation princple you have the option of selecting the **Enable** radio button in the *Advanced ET Setup* radio button in the *Station setup* grid.

Enabling advanced ET setup will make the **Landscape Advanced** subtab available under the **ET Adjusted** tab in the STATIONS area. Use this tab to finetune each station with parameters such as plant type, soil type, slope, and root depth. For more information on advanced ET setup, turn to Chapter 5: Managing Stations.

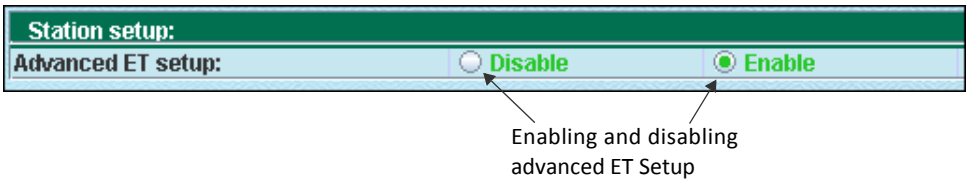


Figure 17: Select the **Enable** radio button to enable advanced ET setup.

Enable/Disable Controller Monitoring

In the *Device Report Monitoring* grid you can enable and configure controller monitoring.

Every third hour the controller will send a keep-alive signal to the server. If the server has not received a signal within a period of 6 hours, a message will be sent to the three e-mail addresses.

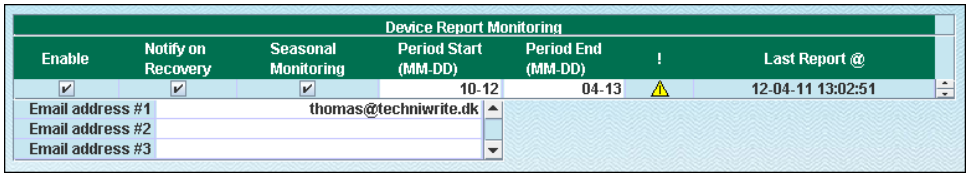


Figure 18: Customizing controller monitoring.

How to do this:

1. Select the **Enable** check box to enable controller monitoring for this controller.
2. Select **Notify on Recovery** to have Cycle Manager notify you, when a controller is up and running again after a breakdown and repair.
3. Select **Seasonal Monitoring** to enable monitoring for a specific period in the **Period Start** and **Period End** fields.

4 In the **E-mail address** fields enter up to three e-mail-adresses that monitoring events should be sent to.

5 Click **Save**.

For related information on monitoring via Cycle Manager, turn to Chapter 10: Data Monitoring.

Chapter 3:
The Cycle Manager Dashboard

In this chapter:

- Overview of the Cycle Manager Dashboard
- Launching Programs Manually
- Launching Stations Manually
- Pausing, Resuming and Stopping Stations or Programs
- Performing a Rain Shutdown

Overview of the Cycle Manager Dashboard

DASHBOARD

Click **DASHBOARD** on the toolbar to get to the Cycle Manager dashboard area.

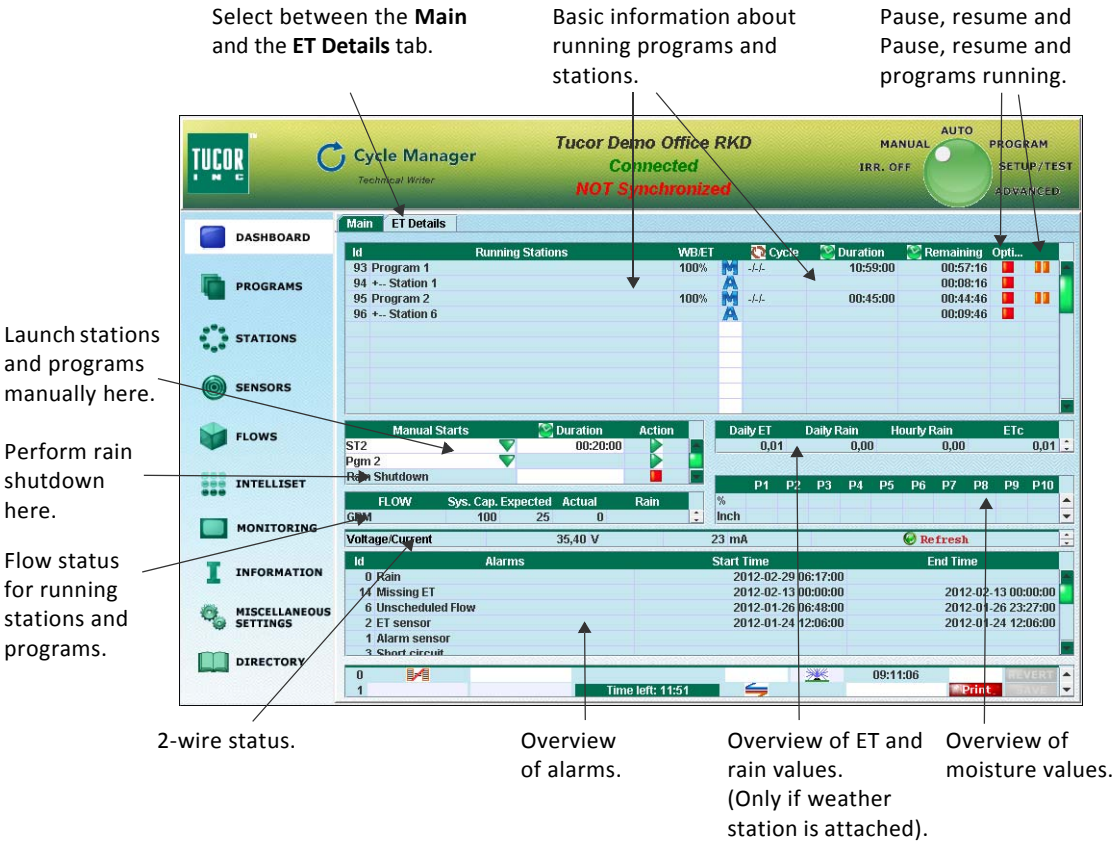


Figure 19: The **Main** tab of the Cycle Manager dashboard.

The two tabs **Main** and **ET Details** gives users a quick and current overview of the current status for a range of relevant information:

- Station and program status
- Flow levels and alarms
- Basic 2-wire status
- Basic ET, rain, and moisture sensor values.

From the **Main** tab, users may launch, pause, resume and stop irrigation for individual stations as well as for programs. Also, a rain shutdown may be performed for programs which have been launched automatically.

From the **ET Details** tab, users can get an overview of ET, rain and moisture values. If required weather data may be requested fromthe weather station and the moisture sensors and subsequently transmitted to the controllers.

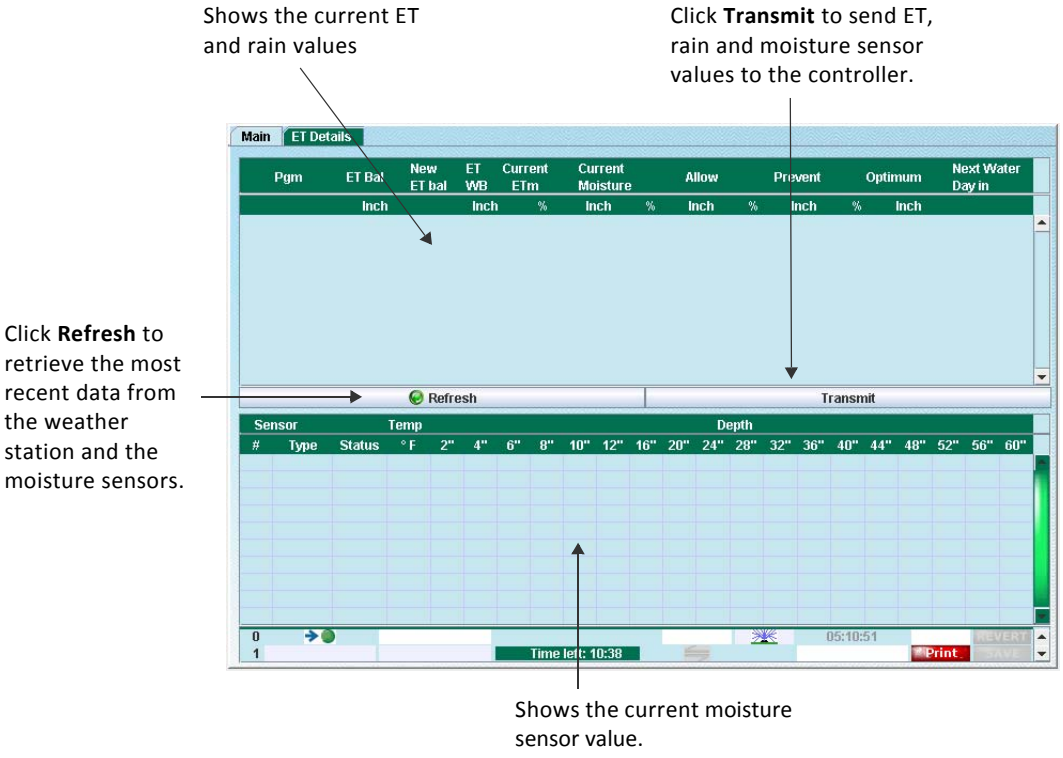


Figure 20: The **ET Details** tab of the Cycle Manager dashboard.

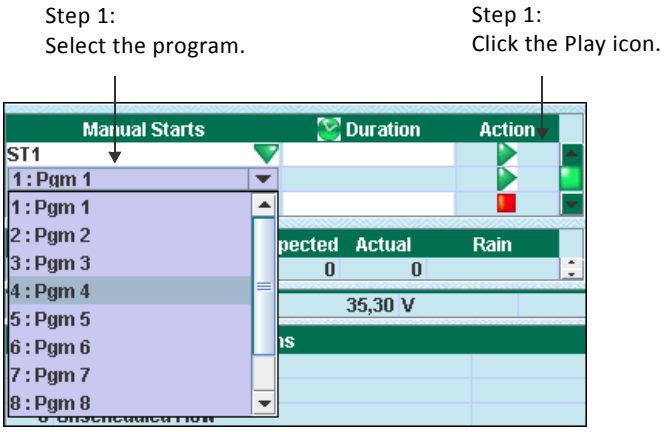
Launching Programs Manually

How to do this:

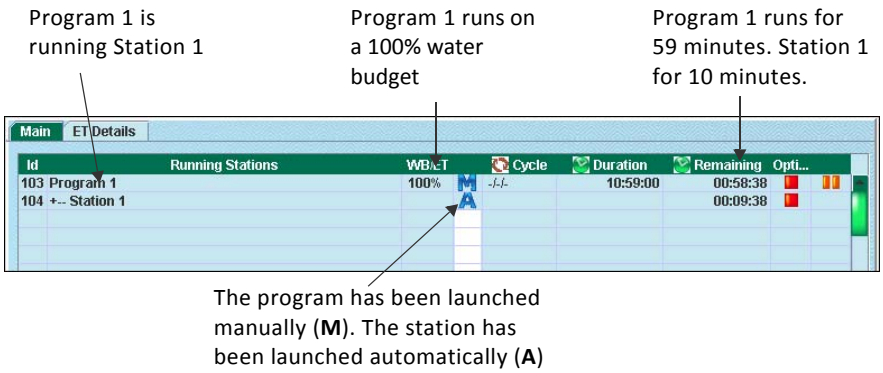
1 Click the green button in the **Programs** field under the **Manual Starts** column, and scroll down to the program you wish to launch. Release the mouse button. The program name is inserted in the **Programs** field.

2 Since the duration of the program and its associated stations have been defined elsewhere, the **Duration** field is dimmed.

3 Under the **Action** column, click the green Play button to launch the program.



4 If the request is accepted, the program is inserted at the top of the grid in the dashboard.



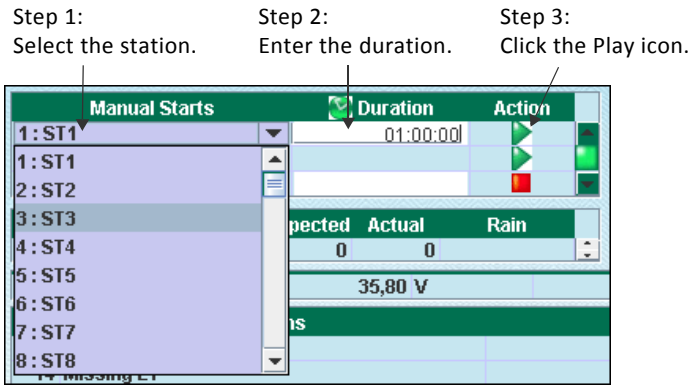
Launching Stations Manually

How to do this:

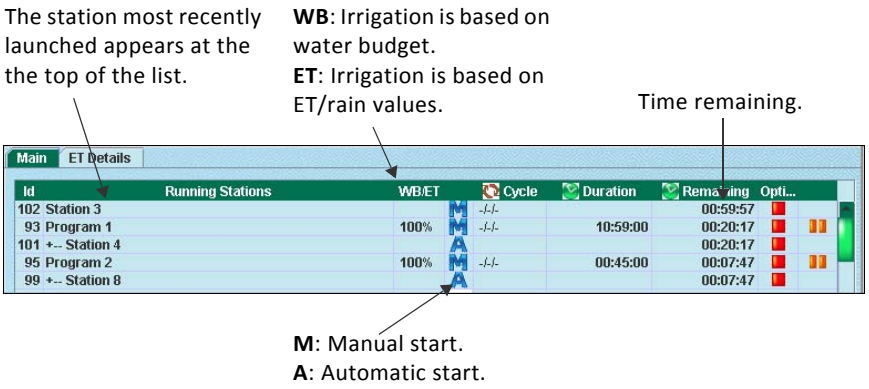
1 Click the green button in the **Stations** field under the **Manual Starts** column, and scroll down to the station you wish to launch. Release the mouse button. The station name is inserted in the **Stations** field.

2 Under the **Duration** column, type the duration of the station.

3 Under the **Action** column, click the green Play button to launch the station.



4 If the request is accepted, the station is inserted at the top of the station grid in the dashboard.

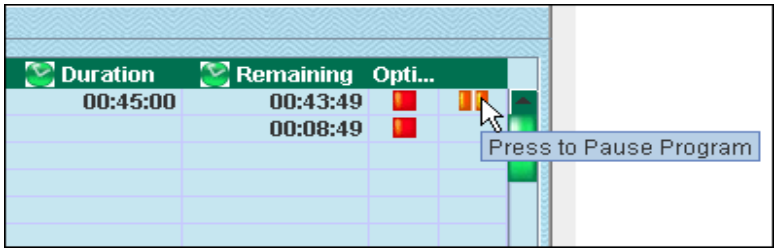


5 Repeat steps 1 to 3 for any other stations you wish to launch.

Pausing, Resuming and Stopping Stations or Programs

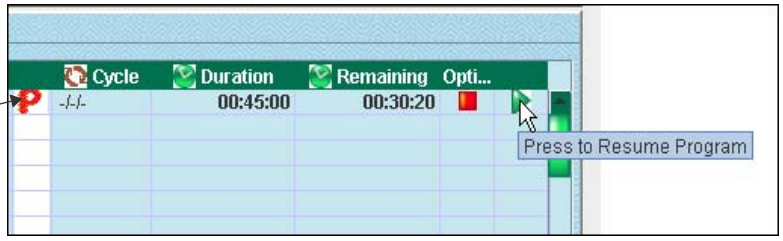
How to do this:

1 To pause a program or a station, click the orange **Pause** button for the current program or station. Notice how the **A** or **M** turns into a **P** for *paused* in the status column,

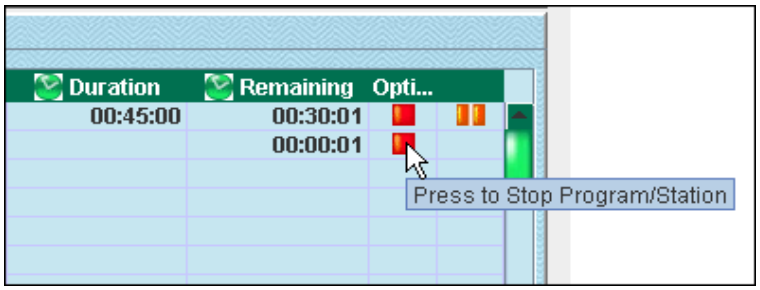


2 To resume a program or a station, click the green **Play** button for the current program or station.

P: Program or station has been paused.



3 To stop a program or a station, click the red **Stop** button for the current program or station.



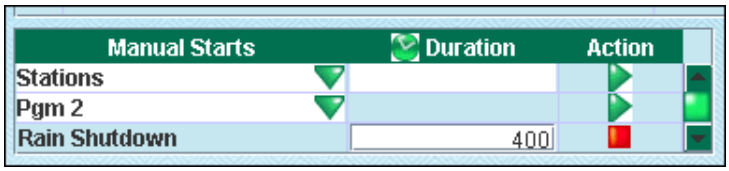
Performing a Rain Shutdown

In case it starts to rain during an irrigation cycle, you may want to perform a rain shutdown.

Note that this feature is only available for programs which have been launched *automatically*. In case programs or stations have been launched manually you should stop them manually.

How to do this:

1 Next to the **Rain Shutdown** field, in the **Duration** column, enter the time (in minutes) you wish to pause irrigation.



2 Click the red square in the **Action** column.

3 To be continued....

Chapter 4:
Managing Programs

In this chapter:

- Making programs active or passive
- Adding a booster pump
- Choosing irrigation control
- Defining water days
- Setting start times
- Setting run times

Click **PROGRAMS** on the toolbar to get to the area in Cycle Manager where you set up your programs. In the **PROGRAMS** area each of the 10 available programs may be managed from its own tab.

The illustration below shows what type of settings that may be managed for each program.

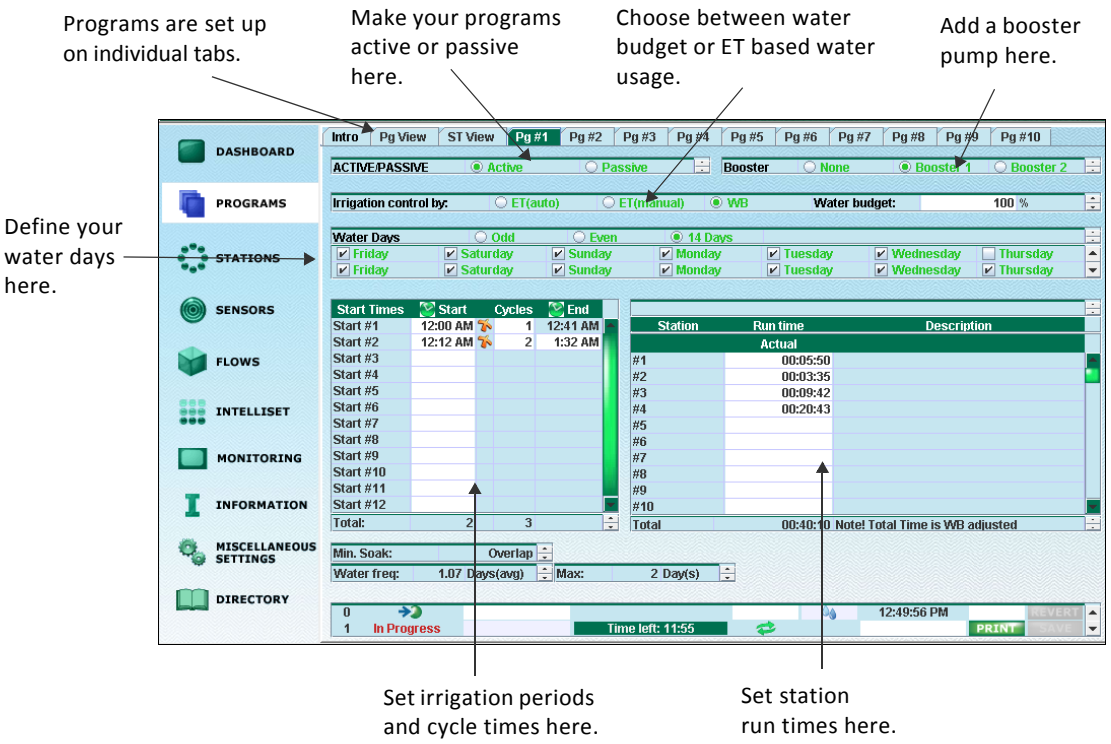


Figure 21: Defining programs in Cycle Manager.

Making Programs Active or Passive

On an overall level, you may set whether a program is active or not. By default all programs are active. In certain cases, however, you may want to make a program passive.

How to do this:

1 In the **PROGRAMS** area, select the subtab of the program you wish to work with.

2 Select the **Active** radio button to have Cycle Manager run the program by its defined run times.

3 Select the **Passive** radio button if you want the program to be excluded from irrigation. You may have reasons to temporarily exclude a specific program or launch it from the dashboard. See **Chapter 3: Launching Programs Manually** on page **40**.

> **Note:** At any time a program can be run manually from the dashboard - regardless of whether it is active or passive or whether it has any start times.

4 Click **Save** and make sure to synchronize the Cycle Manager with the controller. For more information turn to **How to Synchronize** on page **21**.

Adding a Booster Pump

Cycle Manager enables you to to add a booster pump to each program.

How to do this:

1 Select **Booster 1** or **Booster 2** to assign a booster to the program. The booster will be activated each time the program is run.

2 In case a booster is already assigned, and you want to deactivate it, click **None**.

3 Click **Save**.

Choosing Irrigation Control

Cycle Manager allows you to select between three methods of irrigation control: **ET (Auto)**, **ET (Manual)** and **WB**. WB stands for *Water Budget*.

Note: The available settings in this grid depends on your selection of irrigation principle in the **MISCELLANEOUS SETTINGS** area. See **Chapter 2: Choosing the Overall Irrigation Principle** on page **31**.

How to do this:

1 Select **ET (Auto)** if you want the program to be controlled by ET using an automatically calculated ET base. This is the recommended setting.

Thomas: With this option, the ET base is calculated automatically so that it will balance the conversion from ET to water budget to be around 100% at the programs average water days frequency.

2 Select **ET (Manual)** if you want the program to be controlled by ET, but want to use a *user defined ET base*. This option is for the advanced user and requires thorough knowledge of the calculations that lie behind ET base and water budgets.

When entering the ET base you must be aware that the conversion from ET to water budget has a limitation. The controller can work with a water budget up to 999% derived from the ET balance. If the ET base is set to equal the historic ET in summer, and you only irrigate once a week, the derived water budget will typically be 700% and thus gets close to the limit. In such a case it is better to set the ET base to 7 x the historic ET or choose the **ET(auto)** option

3 Select **WB** if you want this particular program to be controlled by a water budget, and then enter a value in the **Water budget** field. The water budget can be set between 0 and 250%.

Choosing this option may be preferable if the program provides water for a fountain or irrigates a newly established turf area.

4 Click **Save**.

Defining Water Days

Cycle Manager enables you to define water days.

How to do this:

1 Set the **Water days** option to either *Odd*, *Even* or *14 days*. Odd days are true Odd days watering; i.e. there will be no watering on the 31st or on February 29th in leap years. For the 14 days calendar the check boxes are used to select specific patterns. The day on the far left in the first line is always the current day.

Click **Save**.

Entering Start Times

When defining start times, Cycle Manager enables you to run your programs

- with cycle & soak
- without cycle & soak

Cycle & soak is enabled for your programs with the **Program Cycle & Soak** option in the **MISCELLANEOUS SETTINGS** area. See **Chapter 2: Enabling/ Disabling Cycle and Soak** on page **32**.

Entering Start Times without Cycle & Soak

How to do this:

1 In the **PROGRAMS** area, select the tab of the program you wish to work with.

2 The **Start Times** column shows the up to 12 start times that may be defined for a program.

> **HINT!** ...Entering more start times is a simple way of performing cycle & soak.

Start Times	Start
Start #1	12:00 AM
Start #2	
Start #3	
Start #4	
Start #5	
Start #6	
Start #7	
Start #8	
Start #9	
Start #10	
Start #11	
Start #12	
Total:	1

3 To enter a start time, place the cursor in the **Start** column, type in the clock (hh:mm), and press **Enter**. The run times of each of the stations in the program can be seen from the **Run time, Actual** in the grid to the right of the **Start times** grid.

4 In case you want to delete a start time, click the **Delete** button. The remaining start times will automatically scroll up.

5 Click **Save**.

Entering Start Times with Cycle & Soak

To enable cycle & soak for your programs set the **Program Cycle & Soak** option in the **MISCELLANEOUS SETTINGS** area. See **Chapter 2: Enabling/ Disabling Cycle and Soak** on page **32**.

Once cycle & soak has been activated the start times grid looks slightly different.

How to do this:

1 In the **PROGRAMS** area, select the tab of the program you wish to work with.

2 The **Start Times** columns shows the up to 12 start times that may be defined for a program

Start Times	Start	Cycles	End
Start #1	12:00 AM	1	12:14 AM
Start #2	8:00 PM	4	8:52 PM
Start #3			
Start #4			
Start #5			
Start #6			
Start #7			
Start #8			
Start #9			
Start #10			
Start #11			
Start #12			
Total:	2	5	

3 To enter a start time, place the cursor in the **Start** column, type in the clock (hh:mm), and press **Enter**.

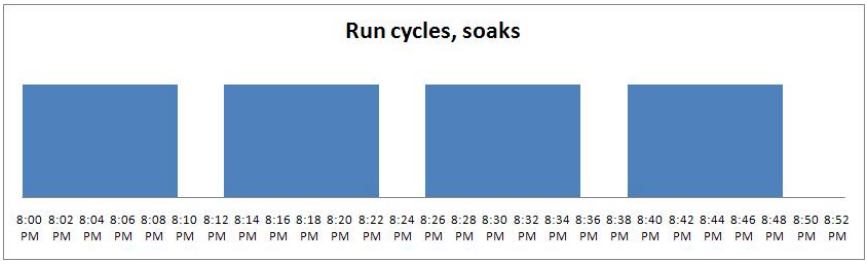
4 Enter the cycle count in the **Cycles** field. Use a number between 1 to 99.

5 The time in the **End** column is derived from the following formula:

*Start Time + Cycles * Total running time of the station.*

When the start only has one cycle, the end time has no effect. To induce a soak between the cycles, the end time can be prolonged.

The controller will automatically insert a soak delay between each cycle and also after the last cycle. The start at 8:00 PM with 4 cycles is illustrated below. It is assumed the run time per cycle is 10 minutes.



Click **Save**.

Entering run times

Cycle Manager allows you to choose between two methods for managing run times. You may:

- Enter the run times manually
- Have Cycle Manager calculate and recommend run times for you.

The *Recommend run time* feature is enabled for your programs with the **Recommend run times** option in the **MISCELLANEOUS SETTINGS** area. See **Chapter 2: Enable/Disable Recommended Run Times** on page **33**.

Entering Run Times Manually

How to do this:

1 In the **PROGRAMS** area, select the tab of the program you wish to work with.

Station	Run time	Description	Description (Station)
	Actual		
#1	00:08:44	Check nozzle ASAP	Fescue - 75 Shade
#2	00:08:42		Bermuda - Full
#3	00:08:25	Increased by 2 minutes	Ground Cover full
#4	00:06:07		Woody Shrubs - 50 Shade
#5	00:57:11		Trees & Grnd Cvr - Full
#6	00:38:27		Bermuda - Full
#7			Fescue - 75 Shade
#8			Bermuda - Full
#9			Ground Cover full
#10			Woody Shrubs - 50 Shade
Total	00:13:10	Note! Total Time is WB adjusted	

2 In the **Run time, Actual** column, the current run time for each station appears in the following format: HH:MM:SS. In case you want to change a run time, enter the new time in the range 00:00:01 to 17:59:50. Blank means no run time.

To delete a run time enter 00:00:00.

3 The **Description** column allows you to associate a description with this station, for instance a reminder about a nozzle needs to be changed or some info about the run time. This information is only displayed on this program's tab.

4 The total run time for the stations in this program will appear from the bottom of the grid. The total run time depends on whether the program is based on water budget or ET, and if it run with or without cycles.

Table 1:

	No Cycles	**Cycles**
Water Budget	Displays the run time for a water day at the given water budget	Displays the run time per cycle for a water day at the given water budget
ET	Displays the run time for a water day at the average water day frequency on the hottest month on the year.	Displays the run time for a water day at the average water day frequency on the hottest month on the year. Each cycle will run a fraction of this time (1/total cycles).

5 Click **Save**.

Using Recommended Run Times

To have Cycle Manager calculate and suggest *recommended run times*, set the **Recommend run times** option in the **MISCELLANEOUS SETTINGS** area. See **Chapter 2: Enable/Disable Recommended Run Times** on page **33**.

When recommended run times are enabled an extra set of options will be inserted on each of the program tabs in the **PROGRAMS** area.

How to do this:

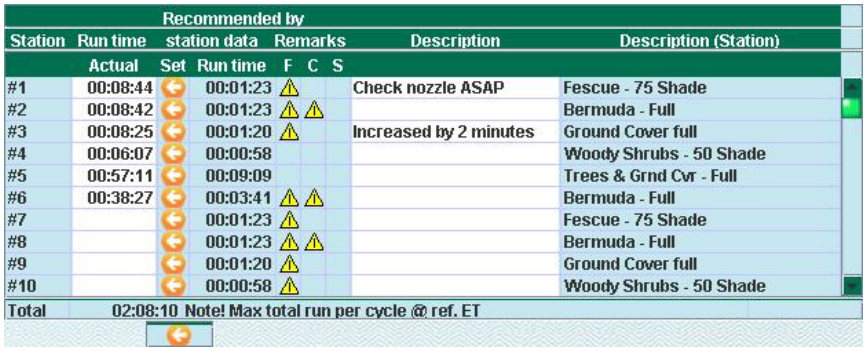
1 In the **PROGRAMS** area, select the tab of the program you wish to work with.

2 In the **Run time, Actual** column, the current run time for each station appears in the following format: HH:MM:SS.

3 The recommended run times appear in the **Run time** column.

4 In the **Recommended by** section, click the arrow in the **Set** column to copy the recommended run time from the **Run time** column to the **Run time, Actual** column.

> **HINT!** ...In case you want to use all recommended run times, click the arrow in the bottom of the grid. This will copy all recommended run times to the **Run time, Actual** column.



Station	Run time	Recommended by station data				Description	Description (Station)
	Actual	Set	Run time	F	C	S	
#1	00:08:44		00:01:23	⚠			Check nozzle ASAP	Fescue - 75 Shade
#2	00:08:42		00:01:23	⚠	⚠			Bermuda - Full
#3	00:08:25		00:01:20	⚠			Increased by 2 minutes	Ground Cover full
#4	00:06:07		00:00:58					Woody Shrubs - 50 Shade
#5	00:57:11		00:09:09					Trees & Grnd Cvr - Full
#6	00:38:27		00:03:41	⚠	⚠			Bermuda - Full
#7			00:01:23	⚠				Fescue - 75 Shade
#8			00:01:23	⚠	⚠			Bermuda - Full
#9			00:01:20	⚠				Ground Cover full
#10			00:00:58	⚠				Woody Shrubs - 50 Shade
Total	02:08:10 Note! Max total run per cycle @ ref. ET							

> **Note:** The run time is derived from sprinkler and landscape data entered in the **STATION** area in combination with the water days frequency, the cycle count and the ET base. If the **Run time** column holds an **N/A** it means that there is insufficient station data to calculate the recommended run time.

5 Keep an eye on the three columns: **F** (Frequency)**, C** (Cycle) and **S** (Soak). They will display a warning if there is a constraint between the station's requirement and the program setup. In those cases it is **not recommended** to run the station in the actual program. Click on the to display a dialog box detailing the constraints.

Explaning the F, C, and S column:

- A warning in the **F** column means the program is not defined to run frequently enough for the station's requirements. This relates to the station's root zone capacity (RZWWS) in combination with the management allowable depletion (MAD). Increase the number of water days to solve this. It is the maximum days between water days which counts. Thomas: Could we provide a realistic real-life example (if such and such, then increase by so many days...) or is this beyond our the scope of the manual?
- A warning in the **C** column indicates that the program does not have enough total cycles for the station's requirements. This relates to the precipitation rate, allowable surface accumulation (ASA) and the soil intake rate. Increase the number of cycles and/or start times to increase the total number of cycles per water day. Thomas: Could we provide a realistic real-life example (if such and such, then increase cycles by so many...) or is this beyond our the scope of the manual?
- A warning in the **S** column indicates that the program does not hold enough cycles for the station's requirements. This relates to the precipitation rate and the soil intake rate. Increase the soak time by adjusting the end times associated with the start times. This requires cycle & soak is enabled. See **Chapter 2: Enabling/Disabling Cycle and Soak** on page **32**

6 The **Description** column allows you to provide a description with this station for instance a reminder about a nozzle needs to be changed or some info about the run time. This information is only displayed on this program's tab.

7 The total run time for the stations in this program will appear from the bottom of the grid. The total run time depends on whether the program is based on water budget or ET and with or without cycles.

Table 2:

	No Cycles	**Cycles**
Water Budget	Displays the run time for a water day at the given water budget.	Displays the run time per cycle for a water day at the given water budget.
ET	Displays the run time for a water day at the average water day frequency on the hottest month on the year.	Displays the run time for a water day at the average water day frequency on the hottest month on the year. Each cycle will run a fraction of this time (1/total cycles).

8 Click **Save**.

HINT! As a help for the constraints, a few imports summaries are display in the bottom of the grid:

Min Soak The minimum soak time achieved for the selected start times and cycle/end time combinations (only if cycle & soak is enabled).

Water freq The average water days frequency. This has a direct impact on ET base for **ET (Auto)** programs.

Max The maximum number of days between water days.

If there are no constraints, it is still possible to display the details dialog by clicking in the empty field.

Chapter 5:
Managing Stations

In this chapter:

- Setting Basic Station Information
- Defining Sprinkler Information
- Defining Basic Landscape information
- Defining Advanced Landscape Information
- Setting Up Weather Adjusted Stations
- Setting Up Water Budget Adjusted Stations

Click **STATIONS** on the toolbar to get to the **STATIONS** area in Cycle Manager. This area provides an easy and centralized way of defining station information.

The tabs and grids available in this area depends on which irrigation principle you choose for your site: *ET Adjusted*, *Weather Adjusted* or *Water Budget Adjusted*. See **Chapter 2: Choosing the Overall Irrigation Principle** on page **31**.

Note that the **Basic** tab is identical for all three irrigation principles.

The illustration below depicts the **STATIONS** area in an ET adjusted site.

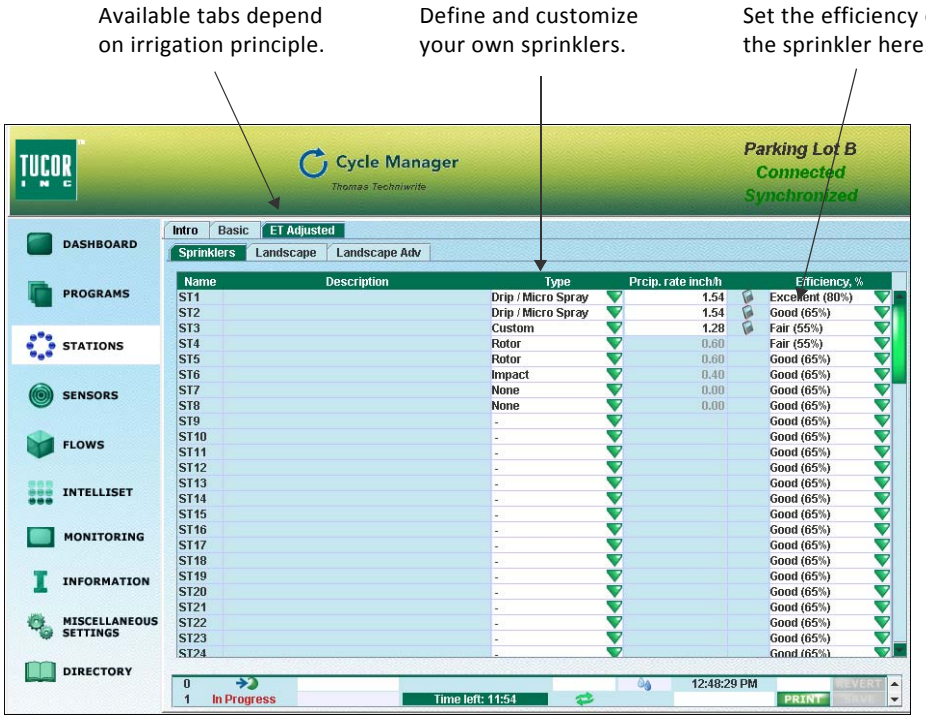


Figure 22: The Cycle Manager **STATIONS** area. The **Sprinklers** subtab.

Setting Basic Station Information

The **Basic** tab enables you to define and monitor features available for stations no matter what irrigation principle has been chosen.

- The **Seq** field defines the order in which the stations run. By default the sequence follows the station number. The sequence can be changed on the controller only.
- The **Name** field hoes the name of the station. This is always ST##, where ## is the station number.

Seq	Name	Exp. Flow	OK	Failed	Description
1	ST1	1	☑	☐	Fescue - 75 Shade
2	ST2	2	☑	☐	Bermuda - Full
3	ST3	3	☐	☑	Ground Cover full
4	ST4	4	☑	☐	Woody Shrubs - 50 Shade
5	ST5	5	☑	☐	Trees & Grnd Cvr - Full
6	ST6	6	☑	☐	Bermuda - Full
7	ST7	7	☑	☐	Fescue - 75 Shade
8	ST8	8	☑	☐	Bermuda - Full
9	ST9	9	☑	☐	Ground Cover full
10	ST10	10	☑	☐	Woody Shrubs - 50 Shade
11	ST11	11	☑	☐	Trees & Grnd Cvr - Full
12	ST12	12	☑	☐	Bermuda Full

In addition to providing this information, the **Basic** tabs enables you to do the following:

- Setting the Expected Station Flow
- Checking Flow Deviation
- Adding a Station Description

Setting the Expected Station Flow

Note: If you employ the “learn flow” principle for your stations, setting the expected flow is not neccesary.

How to do this:

1 The **Exp. Flow** column shows the expected flow for the stations. This can be used for monitor of the actual flow compared to the expected flow for generation of alarms on a percentage deviation.

To enable flow deviation please See **Chapter 7: Managing Flow Settings** on page **79**.

Checking Flow Deviation

How to do this:

1 If the there is a checkmark in the **OK** column it indicates that the station works fine from a flow perspective.

In case the checkmark is missing always make sure that the station has been synchronized. See **Chapter 1: How to Synchronize** on page **21**.

2 The **Failed** column indicates that the station has a flow failure. It could either be too much or too little flow compared to the expected flow. Stations marked *Failed* will be skipped when the controller runs the programs.

HINT! The **Failed** column provides an easy way of temporarily excluding a station from irrigating even if it is part of one or several programs. This could be relevant if for instance a nozzle is defective, and you do not wish to exclude the station permanently, but only until the nozzle has been fixed. Enter a checkmark next to the station you wish to exclude. Remove the chekmark again to include the station again.

Adding a Station Description

How to do this:

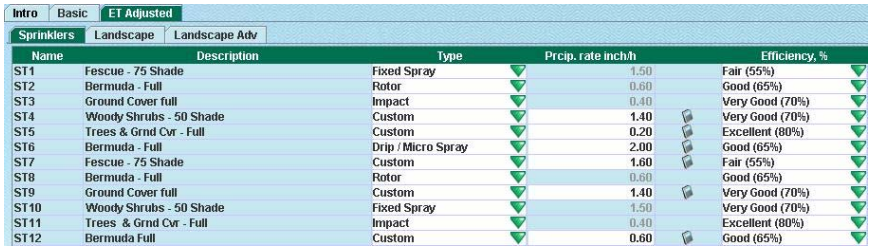
1 In the **Description** provide a fitting description of the station. The description is also shown in the **PROGRAM** area so that you may easily identify the stations used in each program.

Defining Sprinkler Information

Defining sprinkler information is only available for sites that use ET Adjusted irrigation principle. See **Chapter 2: Choosing the Overall Irrigation Principle** on page **31**.

How to do this:

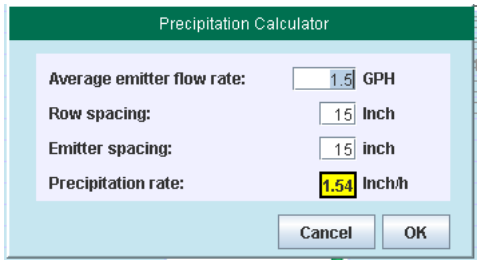
1 On the **ET Adjusted** tab, select the **Sprinklers** subtab.



2 In the **Type** column select the type of sprinkler. Options are *Fixed Spray*, *Rotor*, *Impact*, *Drip/Micro Spray* and *Custom*. The predefined types *Fixed Spray*, *Rotor* and *Impact* are all defined with a fixed precipitation rate and efficiency. In case you wish to configure the precipitation rate and efficiency for your sprinkler, select *Custom* or *Drip/Micro Spray*.

3 The **Prcip. rate inch/h** column shows the precipitation rate in inch per hour. The value is fixed for the standard sprinkler types, but may be adjusted for *Custom* and *Drip/Micro Spray* sprinklers.

Click the small calculator next to the field, and enter values in the **Average emitter flow rate** field the **Row spacing** field and the **Emitter spacing** field to have Cycle Manager calculate the precipitation rate for you.



Select the efficiency of the sprinkler in the **Efficiency, %** column. The efficiency of the sprinkler in combination with its precipitation rate have an impact on the recommended run times for each program. Options are *Fair (55%)*, *Good (65%)*, *Very Good (70%)* and *Excellent (80%)*. Default is *Good (65%)*.

Thomas: Maybe we should show the formula at this point?

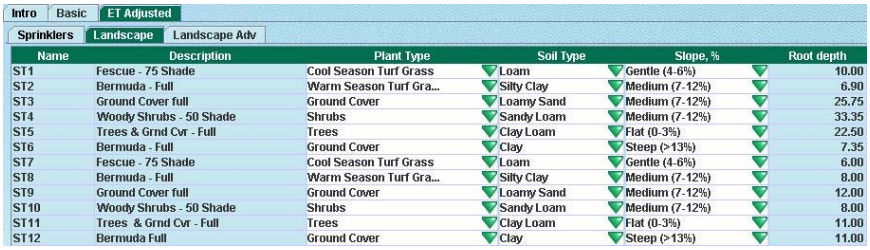
4 Click **Save**.

Defining Basic Landscape information

Defining basic landscape information is only available for sites that use ET Ajusted irrigation principle. See **Chapter 2: Choosing the Overall Irrigation Principle** on page **31**.

How to do this:

1 On the **ET Adjusted** tab, select the **Landscape** subtab.



Name	Description	Plant Type	Soil Type	Slope, %	Root depth
ST1	Fescue - 75 Shade	Cool Season Turf Grass	Loam	Gentle (4-6%)	10.00
ST2	Bermuda - Full	Warm Season Turf Gra...	Silty Clay	Medium (7-12%)	6.90
ST3	Ground Cover full	Ground Cover	Loamy Sand	Medium (7-12%)	25.75
ST4	Woody Shrubs - 50 Shade	Shrubs	Sandy Loam	Medium (7-12%)	33.35
ST5	Trees & Grnd Cvr - Full	Trees	Clay Loam	Flat (0-3%)	22.50
ST6	Bermuda - Full	Ground Cover	Clay	Steep (>13%)	7.35
ST7	Fescue - 75 Shade	Cool Season Turf Grass	Loam	Gentle (4-6%)	6.00
ST8	Bermuda - Full	Warm Season Turf Gra...	Silty Clay	Medium (7-12%)	8.00
ST9	Ground Cover full	Ground Cover	Loamy Sand	Medium (7-12%)	12.00
ST10	Woody Shrubs - 50 Shade	Shrubs	Sandy Loam	Medium (7-12%)	8.00
ST11	Trees & Grnd Cvr - Full	Trees	Clay Loam	Flat (0-3%)	11.00
ST12	Bermuda Full	Ground Cover	Clay	Steep (>13%)	11.00

2 In the **Plant Type** column select the type of plant this station will irrigate. Cycle Manager includes a list of 6 different options: *Trees*, *Ground Cover*, *Shrubs*, *Cool Season Turf Grass*, *Warm Season Turf Grass* and *None*.

Notice that the plant type has an impact on the root depth and thus the requirements for irrigation.

3 In the **Soil type** column, select the type of soil which is predomenant in the area that this station will irrigate. Pick from a list of 6 options: *Sand*, *Loamy Sand*, *Sandy Loam*, *Loam*, *Clay Loam*, *Silty Clay*, and *Clay*. The soil type has an impact on the Available Water Capacity (AWC), the soil intake rate, the Allowable Surface Accumulation (ASA) and the default Management Allowable Depletion (MAD). These parameters again have an impact on the recommended run time for each program. For more information on recommended run times. For more information turn to **Using Recommended Run Times** on page **56**.

For more information on AWC, ASA and MAD, turn to Chapter 5: Defining Advanced Landscape Information.

4 In the **Slope, %** column select the slope of the area that this station will irrigate. The slope value has an impact on the Allowable Surface

Accumulation (ASA), which again influences the recommended runtime for each program. Pick from a list of 4 options: *Flat (0-3%)*, *Gentle (4-6%)*, *Medium (7-12%)* and *Steep (>13%)*. For more information turn to **Using Recommended Run Times** on page **56**

5 In the **Root depth** column the default depth for the chosen plant type appears. If you need to adjust the root depth you can do this on the **Landscape Advanced** tab. For more information turn to **Using Recommended Run Times** on page **56**.

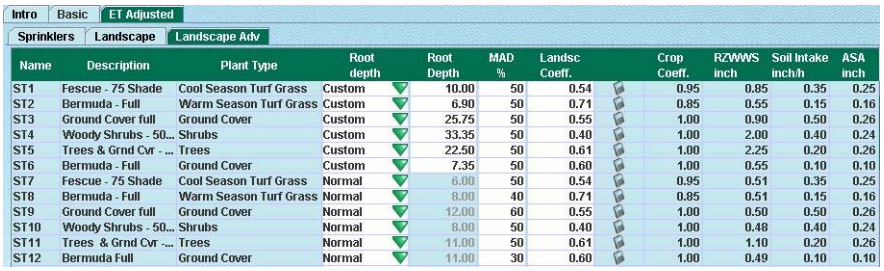
6 Click **Save**.

Defining Advanced Landscape Information

Defining advanced landscape information is only available for sites that use *ET Adjusted* irrigation principle and at the same time have advanced ET setup enabled. See **Chapter 2: Choosing the Overall Irrigation Principle** on page **31** and also See **Chapter 2: Enabling/Disabling Advanced ET Setup** on page **33**.

How to do this:

1 On the **ET Adjusted** tab, select the **Landscape Advanced** subtab.

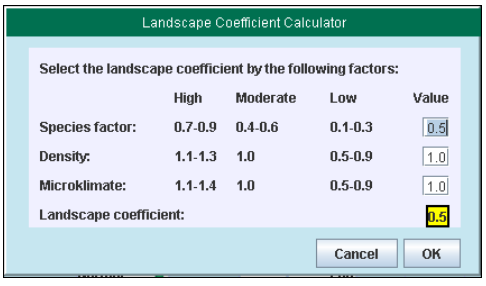


Name	Description	Plant Type	Root depth	Root Depth	MAD %	Landsc Coeff.	Crop Coeff.	RZWWS inch	Soil Intake inch/h	ASA inch
ST1	Fescue - 75 Shade	Cool Season Turf Grass	Custom	10.00	50	0.54	0.95	0.85	0.35	0.25
ST2	Bermuda - Full	Warm Season Turf Grass	Custom	6.90	50	0.71	0.85	0.55	0.15	0.16
ST3	Ground Cover full	Ground Cover	Custom	25.75	50	0.55	1.00	0.90	0.50	0.26
ST4	Woody Shrubs - 50...	Shrubs	Custom	33.35	50	0.40	1.00	2.00	0.40	0.24
ST5	Trees & Grnd Cvr - ...	Trees	Custom	22.50	50	0.61	1.00	2.25	0.20	0.26
ST6	Bermuda - Full	Ground Cover	Custom	7.35	50	0.60	1.00	0.55	0.10	0.10
ST7	Fescue - 75 Shade	Cool Season Turf Grass	Normal	6.00	50	0.54	0.95	0.51	0.35	0.25
ST8	Bermuda - Full	Warm Season Turf Grass	Normal	8.00	40	0.71	0.85	0.51	0.15	0.16
ST9	Ground Cover full	Ground Cover	Normal	12.00	60	0.55	1.00	0.50	0.50	0.26
ST10	Woody Shrubs - 50...	Shrubs	Normal	8.00	50	0.40	1.00	0.48	0.40	0.24
ST11	Trees & Grnd Cvr -...	Trees	Normal	11.00	50	0.61	1.00	1.10	0.20	0.26
ST12	Bermuda Full	Ground Cover	Normal	11.00	30	0.60	1.00	0.49	0.10	0.10

2 In the **Root Depth Type** column, select *Normal*, *Shallow*, *Deep* or *Custom*. Picking *Custom* allows you to enter a root depth (in inches) in the **Root Depth** column.

3 In the **MAD %** column you may set a percentage figure for *Management Allowable Depletion*. Each soil type has its own default MAD. The MAD value has an impact on the RZWWS value and thus influences how frequent the station needs to irrigate.

4 Set the landscape coefficient in the **Landscape Coeff** column. The default landscape coefficient is set to 0.5. The value can be changed directly or via the calculator to the right of the columns.



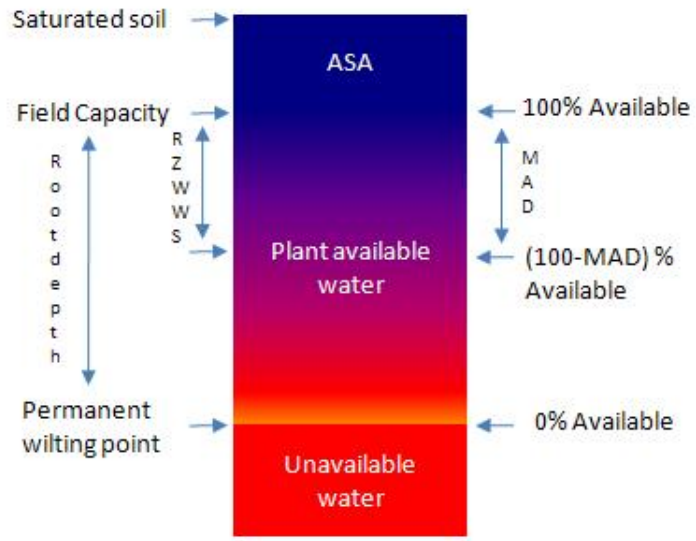
5 In the the **Species factor** field, **Density** field, and **Microclimate** field enter appropriate values to reflect the landscape coefficient of your landscape, and click **OK**.

For more information on landscape coefficients, visit section two in Water Use Classifications of Landscape Species. It is a University of California Cooperative Extension Publication.

6 The **Crop Coeff** column shows the fixed crop coefficient for the different plant types. This value cannot be changed and it depends on the type of crop as well as month of year. Crop coefficients are in particula used in the turf business. If changes are needed then use the landscape coefficient because. Thomas: Fine - but how does the user 'deactivate' **Crop Coeff** for a plant type, so that landscape coefficient may be used instead? We do not explain this.

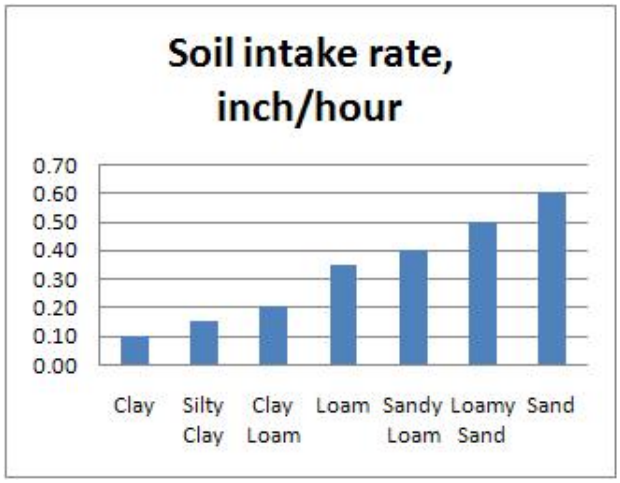
7 In the **RZWWS inch** column the inch value for *Root Zone Working Water Storage* appears. This value is retrieved from the root depth, the soil type's Available Water Capacity (AWC) and MAD according to the following formula:

RZWWS = Root depth * AWC * MAD

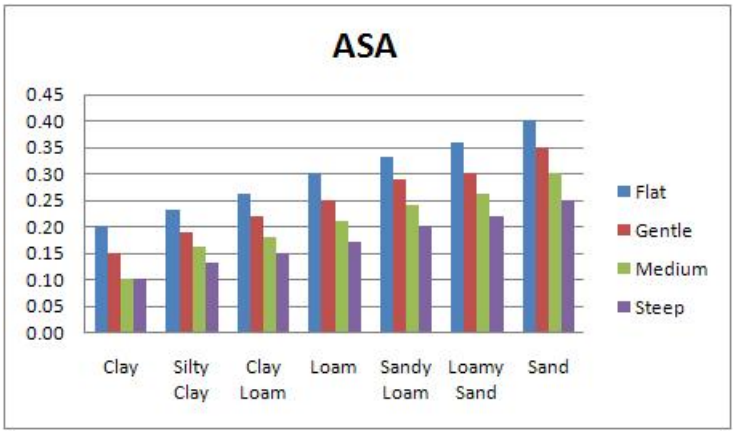


8 The **Soil intake** column shows the soil intake rate in inches per hour. This value is defined by your selection of soil type and has an impact

on cycle and soak. If the soil has a low intake rate you probably should use cycle and soak, but it depends on the precipitation rate of the sprinkler and the ASA (See step 8)



9 The **ASA inch** column depicts the *Allowable Surface Accumulation* value which is defined by the soil type and slope. This value influences cycle & soak. If the soil has a low intake rate but is on a slope, you probably should use cycle&soak. But this depends on the precipitation rate of the sprinkler and how much water the surface can hold before runoff.



10 Click **Save**.

Setting Up Weather Adjusted Stations

Under construction...

Setting Up Water Budget Adjusted Stations

Under construction...

Chapter 6:
Managing Sensors

In this chapter:

- Selecting a rain sensor
- Selecting the ET sensor input
- Setting alarm/flow sensor

Click **SENSORS** on the toolbar to get to the area in Cycle Manager where you can set up information for the three input terminals on the controller.

Note: The steps involved when setting these properties are identical to the steps involved when setting them at the controller.

Refer to the RKD User Manual, Appendix A: *Adding a Rain Sensor* for specific information on how to define rain sensors.

Refer to the RKD User Manual, Appendix B: *Adding an ET Device* for specific information on how to define ET sensor input.

Refer to the RKD User Manual, Appendix C: *Adding a Flow Sensor* for specific information on how to define flow sensors.

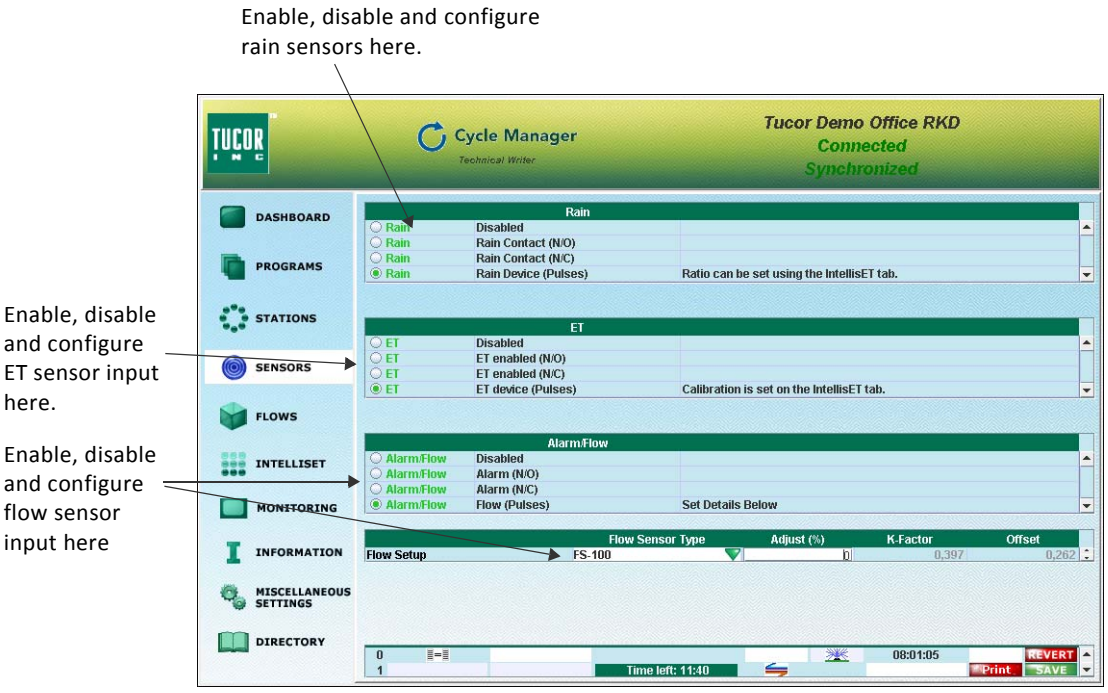


Figure 23: The Cycle Manager Sensors area.

Chapter 7:
Managing Flow Settings

In this chapter:

- Setting threshold values for alarms
- Setting the alarm action for master pump failures

Click **FLOWS** on the toolbar to get to the area in Cycle Manager where you can set up thresholds for flows in the system.

> **Note:** The steps involved when setting thresholds and alarm actions are identical to the steps involved when setting themat the controller.
>
> Refer to the RKD User Manual, Appendix C: *Adding a Flow Sensor*.

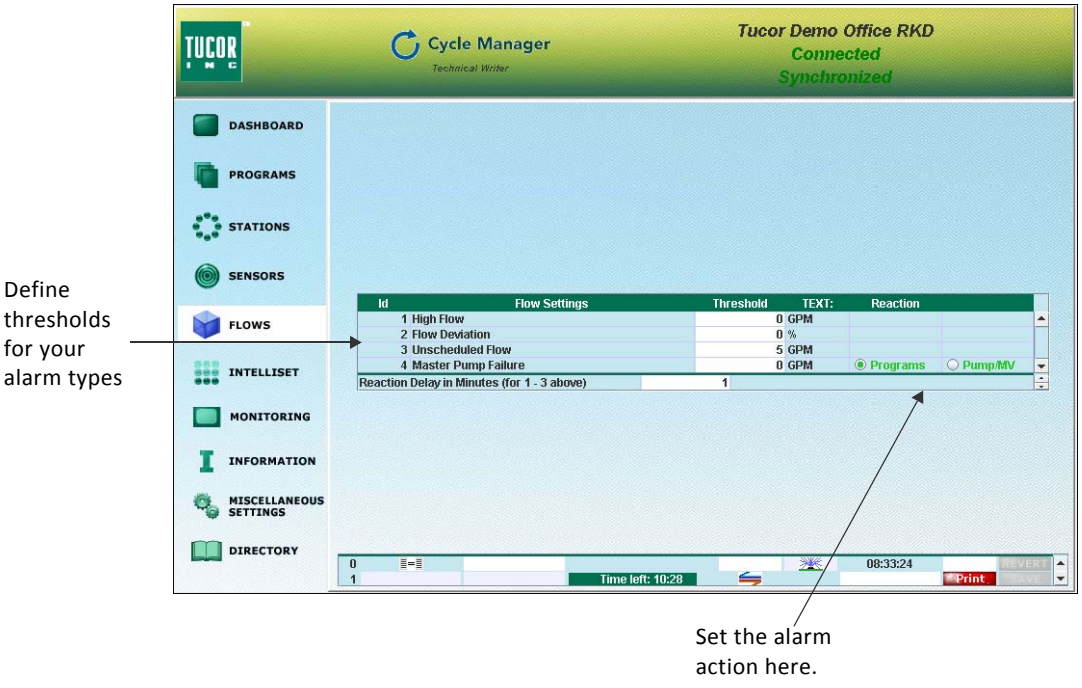


Figure 24: The Cycle Manager FLOWS area.

Chapter 8:
Managing ET and Moisture

In this chapter:

- Entering historical ET data
- Entering the basic ET parameters

Under construction

Click **INTELLISET** on the toolbar to get to the area in Cycle Manager where you can enter historical ET data and set various moisture parameters.

Note: For more information on setting up these values at the controller, turn to the RKD User Manual, Appendix B: *Adding an ET Device* and Appendix D: *Moisture Sensors*.

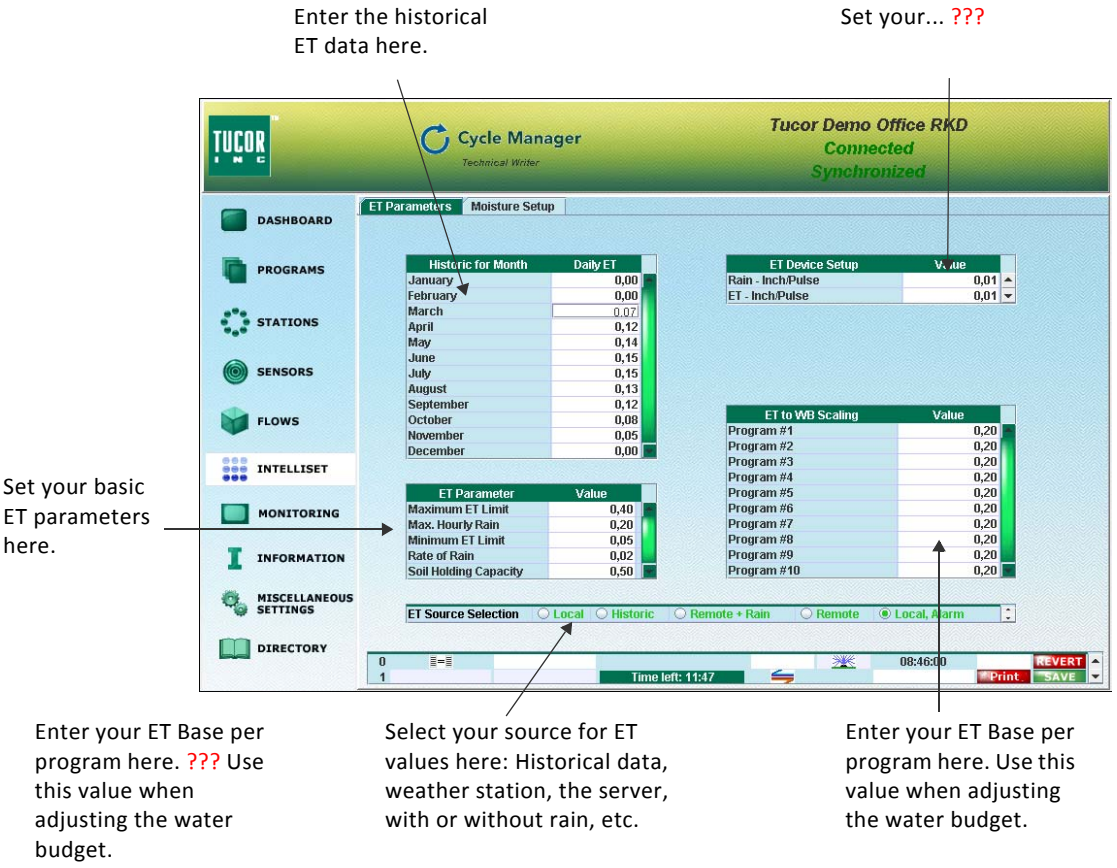


Figure 25: The Cycle Manager INTELLISET area – the **ET Parameters** tab.

Note: For more information on monitoring and managing the exchange of weather data between the weather station, the controller and the irrigation system, turn to Chapter 9: Managing Weather Stations.

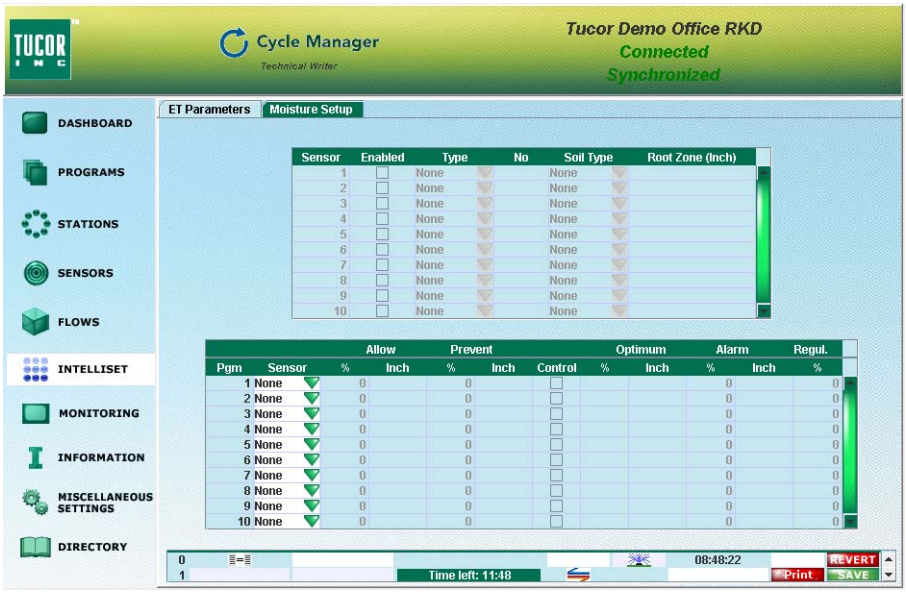


Figure 26: The Cycle Manager INTELLISET area – the **Moistuire** tab.

Chapter 9:
Managing Weather Stations

In this chapter:

- Adding New Controllers to the Weather Station
- The Weather Station Pane – at a glance
- The Controller Pane – at a glance

Choosing a weather station in the opening window, brings you to the weather station **INTELLISET** window which is the main area for monitoring and managing the exchange of weather data between the weather station, the controller and the irrigation system.

Note: The INTELLISET feature described in this chapter exclusively relates to weather stations. The INTELLISET feature is also available for controllers. For more information, turn to Chapter 8: Managing ET and Moisture.

In the weather station **INTELLISET** window you may:

- Specify *when* the server will collect data from the weather stations.
- Specify *when* the server will distribute data to the irrigation system.
- *Add* or *remove* controllers for remote management.
- *Adjust* ET values to compensate for varying geographical conditions.
- *Adjust* the water budget for TWC controllers.
- *Enable* and *disable* the copy of rain alarms from weather station to the controller.

Note: INTELLISET is short for *Intelligent Setting of Evaporation Transportation*.

The weather station **INTELLISET** window is divided into the **Weather Station** pane and the **Controller** pane.

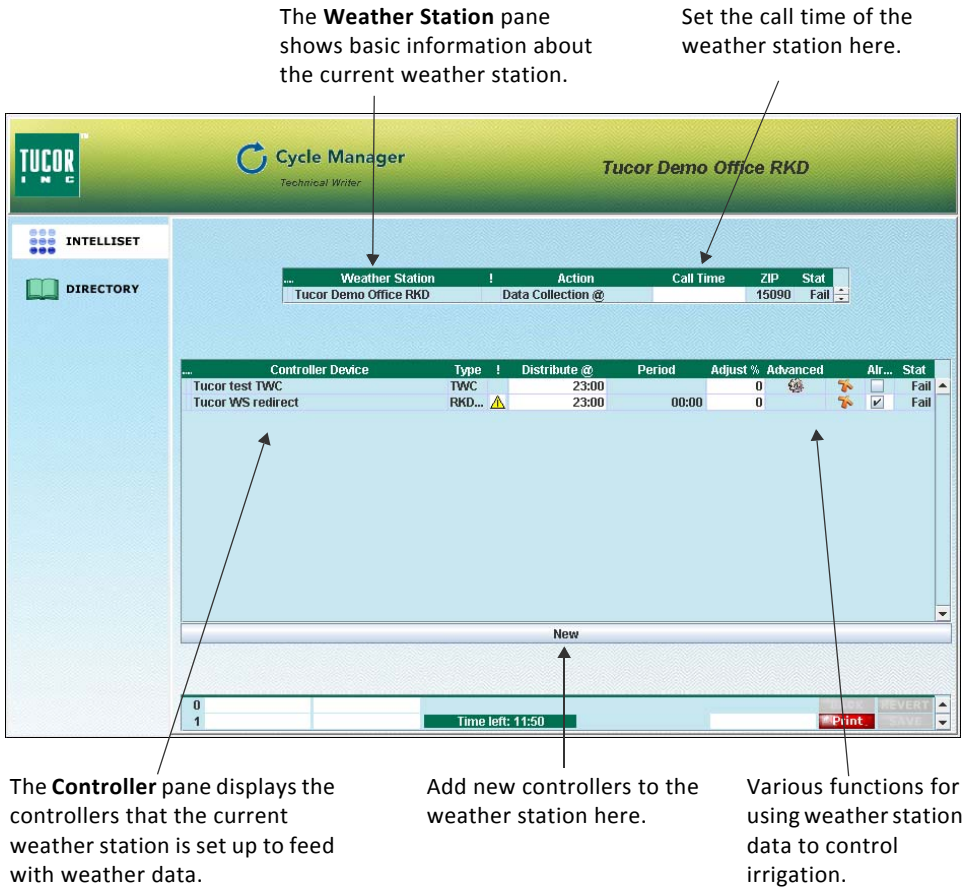


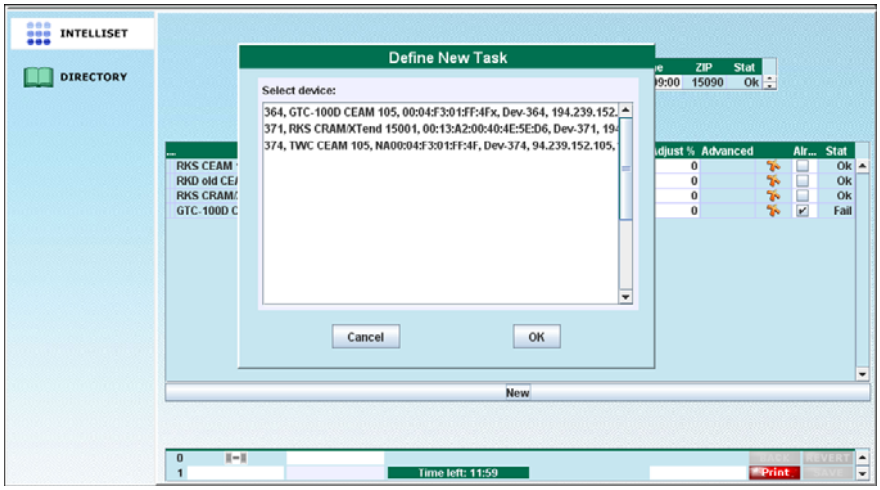
Figure 27: The weather station **INTELLISET** window.

Adding New Controllers to the Weather Station

The weather station **INTELLISET** window allows you to add new controllers.

How to do this:

1 Click the **New** button to open the **Define New Task** window.



2 Select the controller, and click **OK**. The controller is added to the **Controller** pane. You can only add one controller at a time.

The Weather Station Pane – at a glance

The **Weather Station** pane shows basic information about the current weather station, and allows you to:

- set the call time for the weather data. i.e. the time of day, the server should retrieve data from the weather station.
- verify that the weather station is in the correct time zone.
- monitor the connection status.

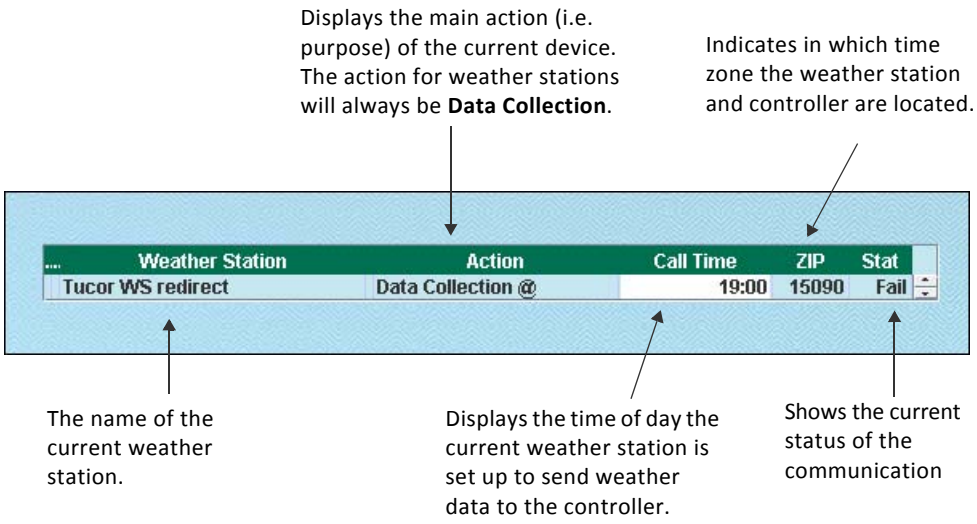


Figure 28: Contents of the **Weather Station** pane.

Setting the Call Time

This **Call Time** relates to the time set in the **Distribute** field for the controller. When entering distribution times it is highly recommended that you enter a minimum of 15 minutes between the call time and the distribution time. The distribution time should *always* be after the call time. See also For more information turn to **Adjusting the Distribution Time** on page **92**.

How to do this:

1. Place the mouse cursor in the **Call Time** field.
2. Use the *Up* and *Down* arrow keys to adjust the time, or assign the number by placing the cursor directly in the field and typing the number.
3. Press **Enter** to save any changes.

Interpreting status information

The **Stat** field shows the current status of the communication.

Options are:

- **Run** – Data is currently being retrieved from the weather station.
- **OK** – The last collection of weather data was successful.
- **Fail** – The connection to the weather station is not available.

HINT! Hover the mouse over the **Stat** field to get more detailed information about the recent transfer.

Verifying the Time Zone (For Tucor administrators only)

Use the **Zip** field to verify in which time zone the weather station and controller are located.

Important! The system expects that weather stations and controllers are located in the same time zone.

The Controller Pane – at a glance

The **Controller** pane displays the controllers that the current weather station is set up to feed with weather data.

The **Controller** pane enables you to:

- adjust the distribution time.
- adjust the irrigation period.
- adjust ET values.
- adjust the water budget (for TWC controllers only).
- activate/deactivate rain alarms.

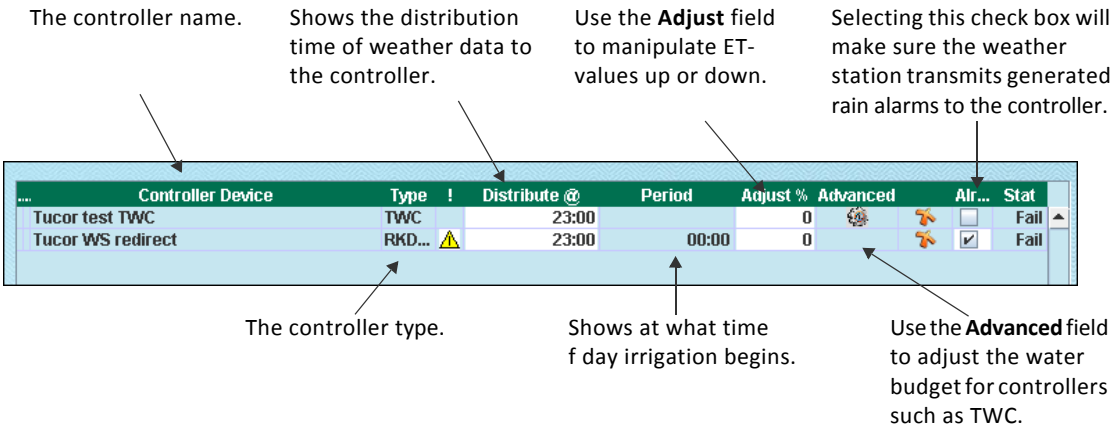


Figure 29: The **Controller** pane.

Adjusting the Distribution Time

How to do this:

1 Place the curser in the **Distribute** field.
2 Use the *Up* and *Down* arrow keys to adjust the time, or assign the number by placing the cursor directly in the field and typing the number.
3 Press **Enter** to save your changes.

This field relates to the time set in the **Call time** field for the weather station. When entering distribution times it is highly recommended that you enter a minimum of 15 minutes between the call time and the distribution time. The distribution time should *always* be after the call time.

Adjusting the ET Values

Use the **Adjust** field to manipulate ET values percentage-wise up or down. This may be relevant if your system spans a large area, and varying conditions are likely to influence ET values.

If, for instance, a controller maintains a sunny area you can choose to add 20% to the ET values received to compensate for faster evaporation in that area thus making sure that irrigation is adjusted accordingly.

How to do this:

1 Place the curser in the **Adjust** field.
2 Type in the new percentage figure. Use a minus percentage (e.g. –10%) to adjust ET values down.
3 Press **Enter** to save your changes.

Adjusting the water budget

Non web-based TWC controllers do not contain the desired functionality to receive ET values and rain values, which means that they are not able to adjust the water budget prior to irrigation. However, the server recreates the necessary functionality in Cycle Manager, thereby enabling TWC controllers to work with adjusted water budgets.

Important! Adjusting the water budget is only relevant for non web-based TWC controllers. The feature is integrated in web-based TWC controllers.

So instead of the controller handling the calculation, Cycle Manager performs the required math, based on ET values and rain values retrieved from the weather station. The result is communicated to the TWC controller which will then run the programs based on the result. More precisely Cycle Manager communicates to the TWC controller whether the irrigation should be prolonged or shortened to make up for any changes in the water budget.

The water budget is calculated from the following formula:

$$Water\ budget = \frac{\text{ET Balance}}{\text{Base ET}} \text{ x } 100$$

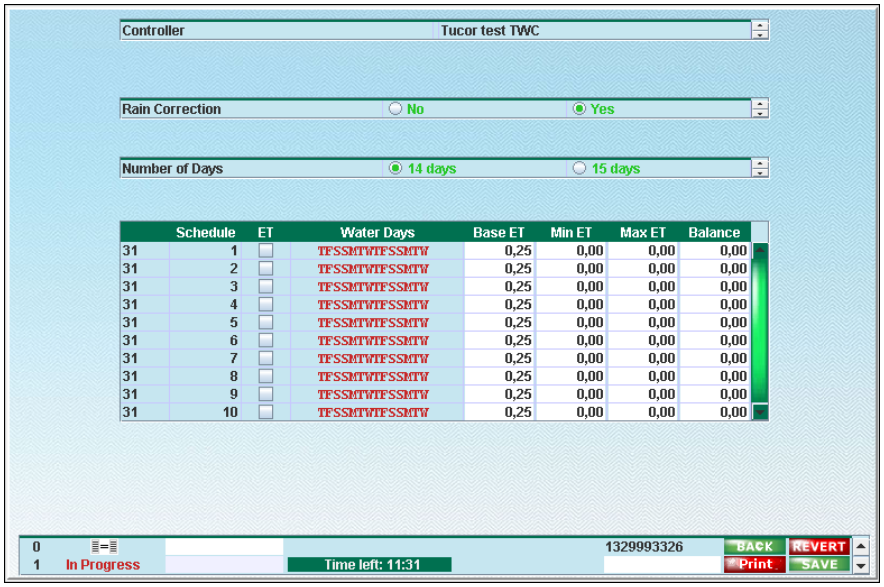
A calculated water budget below 100% will result in less water distributed than the program dictates (irrigation steps will be shortened). A calculated water budget above 100% will result in longer irrigation cycles. For instance, if the water budget is determined as 200%, irrigation times will be doubled. If the budget is 50% irrigation times will be halved. In this way, ET values and rain values may be used to control the actual needs for irrigation.

Another example – if the programs are designed to apply 0,30" at 100%, then Cycle Manager will set the water budget to 67%, if the generated ET balance is 0.20".

How to do this:

1 To access water budget adjustment, click **Advanced** in the **Controller** pane. The **Advanced** window is displayed.

2 At first you must indicate whether the collected rain value should be included as part of the water budget adjustment or not. Click **Yes** to include the rain value in the calculation, click **No** to exclude it.

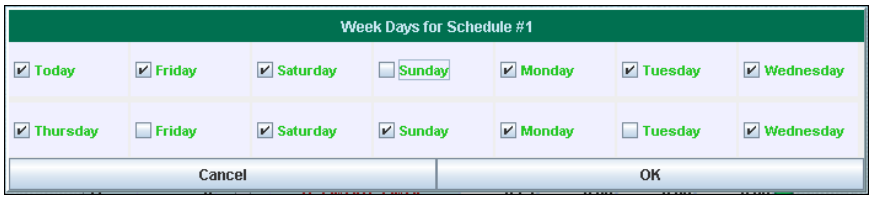


3 Next, select the water day period in the **Number of Days** field. Many sites work with a 14 day period, but for those site that irrigates in 3 days interval, it may be desirable to implement a 15 day water period. Note how the selected period is reflected in the **Water Days** field in the **Water Budget** grid.

4 In the grid at the bottom of this dialog you see the 10 available irrigation programs defined in the TWC controller. Use the **ET** field to activate/deactivate water budget adjustment for a particular program. A checkmark indicates that the current program will be subject to water budget adjustment based on the ET values received.

5 The **Water Days** column displays the water days period. Each day of the week is represented by its initial letter. To exclude and include

water days, click the mouse somewhere in the **Water Days** field, and select/deselect the desired days in the dialog box.



Important! The settings in the **Number of Days** and **Water Days** fields, should be identical to the same settings in the TWC controller. If not, the system will not perform as expected.

6 The **Base ET** field displays the ET base setting which is by default 0,25" for TWC controllers. The ET Base corresponds to a water budget of 100%. Depending on weather conditions in your area you may want to change this value. For more information turn to **Consequences of Changing the Irrigation Period** on page **98**.

7 In the **Min ET** field set a minimum value to ensure your irrigation system does not irrigate too little water. If the calculated ET Balance turns out to be below the Min ET value, the water budget will be set to 0%, thus preventing inefficient irrigation. The server will save the figure so that non-irrigated water will be used when calculations result in a value exceeding the **Min ET** value.

8 Use the **Max ET** to prevent your system from providing too much irrigation. If the ET Balance turns out to be *above* the Max ET value, the Max ET will be used to calculate the water budget, and the excessive ET will remain in the balance for the next irrigation period.

9 The **Balance** field holds the adjusted ET data. i.e. the adjusted water budget. If you have set the **Rain Correction** option to *Yes*, the calculation will also include the rain value which will then be subtracted or added.

Note: on Minimum and Maximum ET.
Cycle Manager allows you to use minimum and maximum ET values to limit the adjustment.

If you set the **Max ET** and/or **Min ET** values to the default 0,00 value it implies that they are not used for adjusting the water budget. In other words you should keep the default values if you have neither upper nor lower limits for your irrigation.

If the generated water budget is 0%, the current program will become passive until the next irrigation period. This will be the case when the ET Balance turns out to be less than the Minimum ET. Then the water budget will be set to 0%.

If the generated water budget is above 250% (e.g 300%), the water budget will be limited to 250% and the excessive ET (50%) will remain in the balance and be used for the next irrigation period.

For more information turn to **Consequences of Changing the Irrigation Period** on page **98**.

10 If your system is set up to irrigate each day, you will most likely not see the content of the **Balance** field as the field will be reset just after distribution has happened. If, on the other hand, you leave many days between each irrigation, the **Balance** figure will accumulate and you will be able to see the content the field.

Example:

Balance: 0,40
ET Base: 0,25
Water budget: (0,4/0,25)*100 = 160%

In this case, the irrigation period will be prolonged by a total of 160%. Thus, if the controller has a normal budget (the ET Base) of 0,25" over a 30 minute period, then irrigation will run for 48 minutes to correct for the increased ET. The additional 18 minute of irrigation make up for additional 60% in the adjusted budget.

Potential pitfalls when adjusting the Base ET

This section is particularly relevant in case your system is set up to irrigate only once a week.

Important! Adjusting the Base ET is only relevant for non web-based TWC controllers. The feature is integrated in web-based TWC controllers.

Cycle Manager expects that the TWC is set up with start times and steps per solenoid, so that 100% of the water indicated in ET Base will be delivered to the landscape. By default, ET Base holds 0,25", which indicates that the program will deliver 0,25"of water. This ET value is quite typical for July and corresponds to a water budget of 100%.

If you only irrigate once a week, you must set the ET Base equally higher so that the same amount of water is supplied. In this case 7, days of 0,25" equals 1,75" water. The 1,75 " still corresponds to a water budget of 100% – but seen over one week of irrigation. In other words, the program must supply one week's water in the irrigation period.

As described earlier, the water budget is calculated from the ET Base and the ET Balance. The ET Balance is generated from the ET and rains values collected by the weather station and transferred each day. In case no irrigation takes place, the ET balance is transferred to the next day.

This is a potential problem, since only a maximum of 250% ET Balance is allowed. If the accumulated ET Balance exceeds the 250% limit, the remaining balance is not used but will be transferred to the next period – 7 days later. For instance, if the ET Balance is 400%, the 150% will be saved for the next round – but chances are that the next time ET Balance will be even higher. The result is that you may never use up the ET Balance.

To deal with this, make sure the ET Base is not set too low. As a rule of thumb set the ET Base so it corresponds as much to what you expect to use – this will make the balance sway around 100%.

Important! Do not set the ET Base too high either because then you risk a very water budget adjustment of 5–10%. This may jeopardize the precision in your site's irrigation since irrigation cycles will be too short and the water supply consequently too insufficient.

Consequences of Changing the Irrigation Period

In case your site includes a weather station that feeds one or more controllers with ET and rain values, it's important to be aware of the consequences of implementing non-standard irrigation periods for your controllers. In particular when you move the irrigation starting point 'back in time'.

The irrigation period normally starts at midnight (12 AM) and runs for 24 hours. However, under certain weather conditions you may want irrigation to start earlier than this, for instance already at 8 PM when the sun has set. You do this by moving the start time on the controller into the PM window with the desired amount of hours, in this case 4 hours.

However, in case there is a time span between your weather station's collection time and the irrigation period start time which is most likely to create a difference between the actual ET and rain values and the values transmitted to the controller. So, as a consequence, the weather station will feed the controller with ET and rain data which are no longer valid.

In Figure 17 next page, the weather station collects ET and rain values at 7.15 PM. The irrigation start time at the controller is set to 8 PM – not 12 AM, which means that the values used, will be the ones collected at 7 PM – one hour earlier.

Note: The consequences described in this section relates to RKS, RKD, GTC-S, GTC-D controllers but not by TWC controllers.

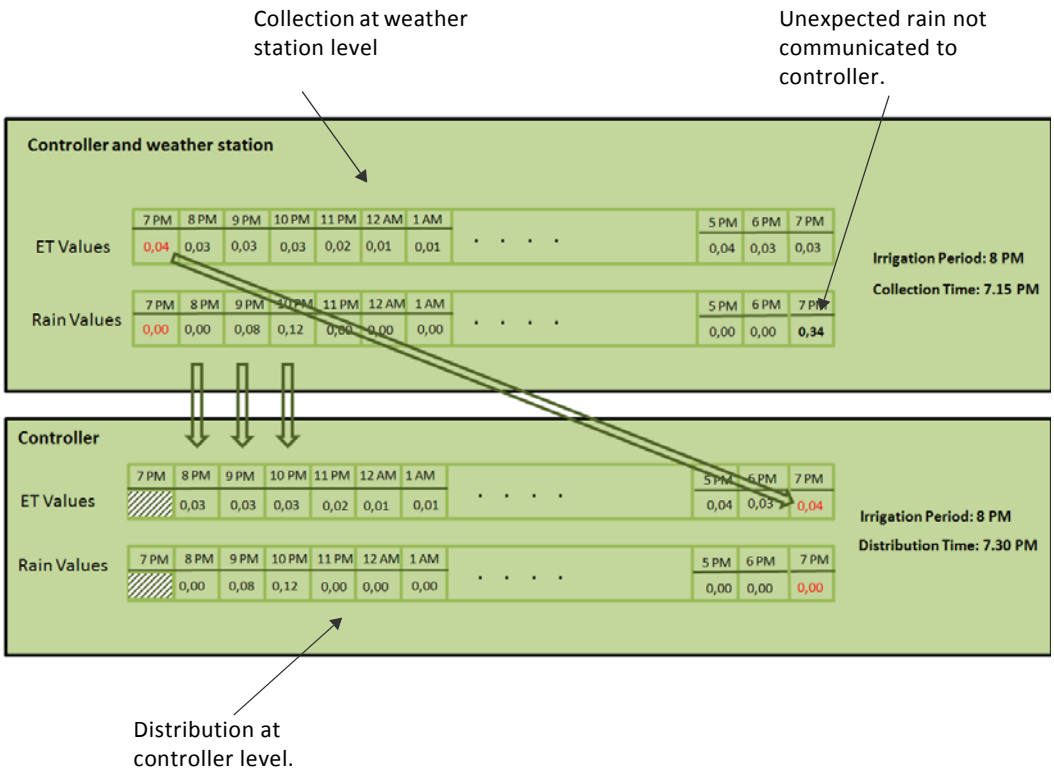


Figure 30: Consequences of changing the irrigation period.

One consequence is seen the next evening. From 7 PM to 8 PM, 0,34" of rain falls – but this is not communicated to the controller. As a consequence, irrigation will continue unnecessarily – and there will be a variance in the water data logged. For more information on monitoring data, turn to Chapter 10: Data Monitoring.

The more time span you leave between the collection time in the weather station and the irrigation start time for the controller, the more potential difference there will be in ET values and the actual water data logged within a 24 hour period. Note that in the long run, differences will of course be levelled out.

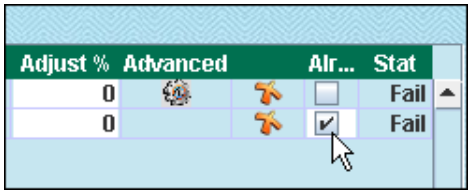
Activating the Transmission of Rains Alarms

The **Alarms** field is relevant if the weather station is able to generate a rain alarm. If this is the case the weather station will transmit the alarm to the server which will then communicate it to the controller so the appropriate action may be taken. In case a rain alarm has been triggered, the server will try to ensure that there is consistency between the alarm at the controller and at the weather station.

Note: The transfer of rain alarms is supported by RKS, RKD, GTC-S, GTC-D controllers but not by TWC controllers.

How to do this:

1 To activate the transmission of rain alarms, click in the **Alarms** field to leave a checkmark.



2 To deactivate transmission, click in the **Alarms** field to remove the checkmark.

Note: In case the Internet connection is down for a longer period of time, it may well happen that non-communicated rain alarms as well as their revocation will influence irrigation.

The mechanism behind the communication of rain alarms is that the server will send a message to the controllers every 30th minute in case a rain alarm has been received from the weather station. This will stop irrigation for 3 hours. This will be repeated every 30th minute upon which the rain alarm is extended for another 30 minutes.

However, if the internet connection is down for more than 3 hours, the server will not be able to send out information to the controllers that the rain alarm should be extended before the expiration of the most recent extension. As a consequence, irrigation will be started, even if it shouldn't be.

The problem is also seen the other way around i.e. when the revocation of a rain alarm at the weather station cannot be communicated to the server. Consequently it cannot be forwarded to the controllers that irrigation should be started again. For every 6 hour the server will query the master-controller at the weather station if a rain alarm is still there. If the internet connection is down at the time of query, the server will assume that the rain alarm is not there anymore and a revocation will be sent to the controllers.

Chapter 10:
Data Monitoring

In this chapter:

- Monitoring Water Usage
- Monitoring ET and Rain Values
- Monitoring Moisture Values
- Monitoring Programs and Stations
- Monitoring Error and Status Events
- Monitoring All Data

Click MONITORING on the toolbar to open a selection of tabs and subtabs with useful site information about:

- Water usage
- ET, rain and moisture values
- Station and program behavior and status
- Various error and status events

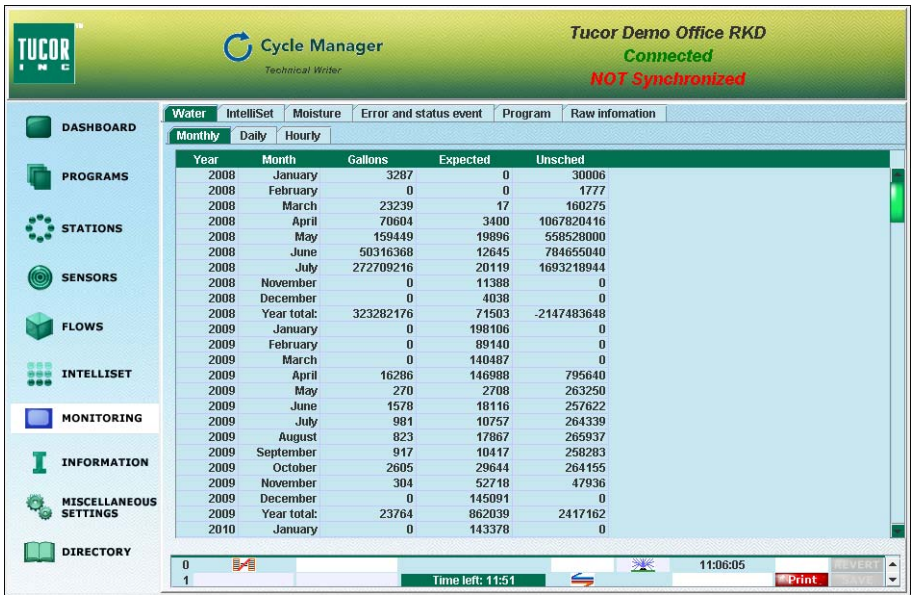


Figure 31: The opening tab of the MONITORING area shows the water usage.

Note: Data monitoring is supported by RKS, RKD, GTC-S, GTC-D controllers but not by TWC controllers. Whether or not your controller is set up to send monitor data to Cycle Manager depends on your communication subscription.

Monitoring Water Usage

The **Water Usage** tab shows water usage information for your site in gallons on a *monthly*, *daily* and *hourly* basis. Click the relevant subtab (**Monthly**, **Daily**, **Hourly**) to get the information you want.

For each period, the actual, the expected and the unscheduled amount of water used will be listed. Also shown are the accumulated values per year, month and day.

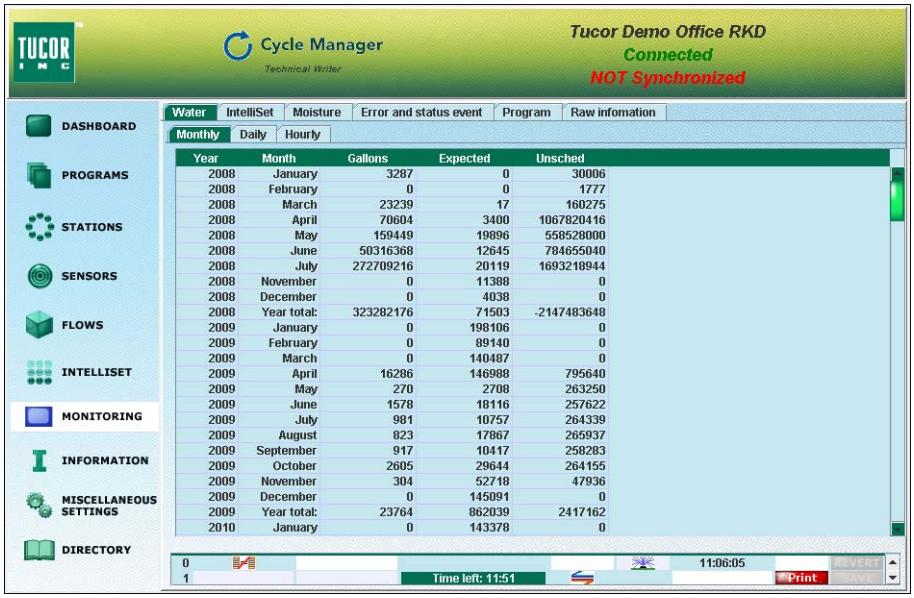


Figure 32: The opening tab of the Monitoring tool shows the water usage.

Gallons Shows the actual water usage as registered by the flow sensor attached to your controller.

Expected Shows the accumulated expected water usage. This value is derived from the settings you have entered for your stations.

Unsched shows the water usage registered when no programs are running. Mostly, unscheduled irrigation is caused by unexpected needs to irrigate for instance due to extreme drought, defective valves, programs not running, etc. Always examine your system if these values seem high. It could indicate a leak in the system.

Monitoring ET and Rain Values

The **IntelliSet** tab shows various key information related to ET and rain counters as received by weather stations at day shift. Information are available on monthly, daily and hourly basis.

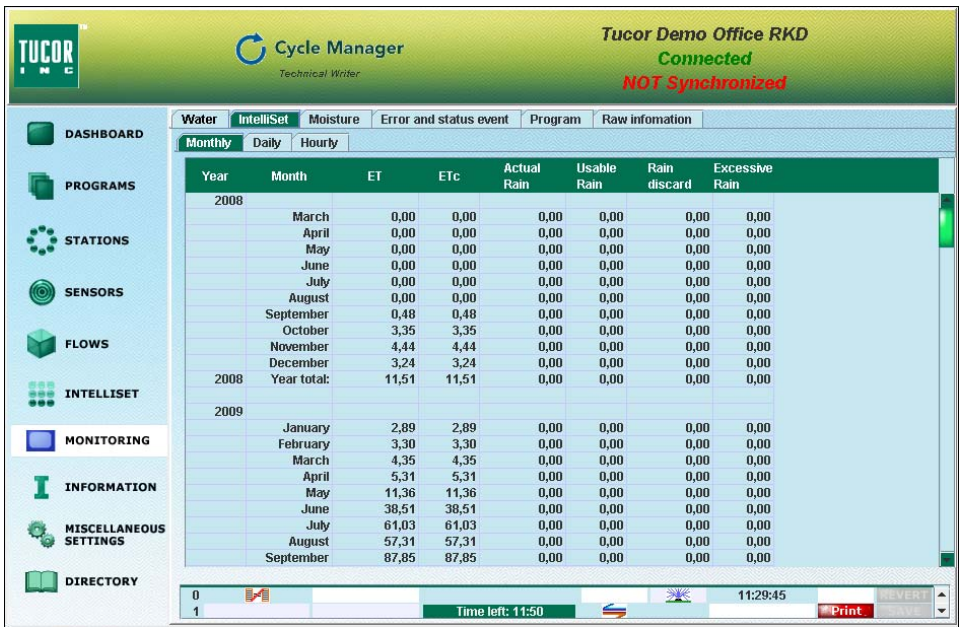


Figure 33: The **IntelliSet** tab provides ET and rain values on a monthly, daily an hourly basis

ET Shows the actual ET-value received from the weather station. More precisely, the ET value corresponds to the amount of water that have evaporated and transpired in the period.

ETc Shows the corrected ET value i.e. the value you get by subtracting the amount of usable rain from the ET value.

Actual Rain Shows the amount of rain (in inches) that has fallen in the period.

Usable Rain Usable rain is the amount of rain which is left over when you subtract the discarded rain value from the actual rain fallen within an hour. The Usable Rain value relates to the Max Hourly Rain setting.

If for instance Max hourly rain has been set to 0,2" and an amount of 0,3" of actual rain falls within an hour, then the rain discarded is 0,1". The figure for Usable Rain is then actual rain fallen minus the rain discarded, in this case 0,2".

Obviously, the amount of usable rain within an hour can never be more than the setting for Maximum rain per hour.

Rain Discard Shows the amount of rain (in inches) that the soil has not been able to hold. This is also referred to as *runoff water*.

Excessive Rain Excessive rain is the amount of rain that it has not been possible to use in the current period. If any rain is left over after the ET value has been subtracted from the Usable Rain value, it is referred to as Excessive rain.

The value in **Excessive rain** will be used to adjust the water budget for the next day. If it does not rain the following day, we can use the Excessive rain for irrigation.

If for instance the amount of usable rain within 24 hours is 0,55", and the ET is 0,25", then the Excessive rain is 0,30". The 0,3" is then transferred to the next 24 hour period.

Monitoring Moisture Values

The **Moisture** tab shows key information about up to 10 moisture sensors that can monitor soil moist and adjust irrigation accordingly. Both conventional sensors and probes will be monitored.

Monitor information is split over three tabs: **Overview**, **Details** and **Probes**.

The Overview Tab

The **Overview** subtab shows the hourly percentage humidity figure for each sensor (**S1-S10**). Use this tab to get a quick overview of moisture sensors – also about probes in the system.

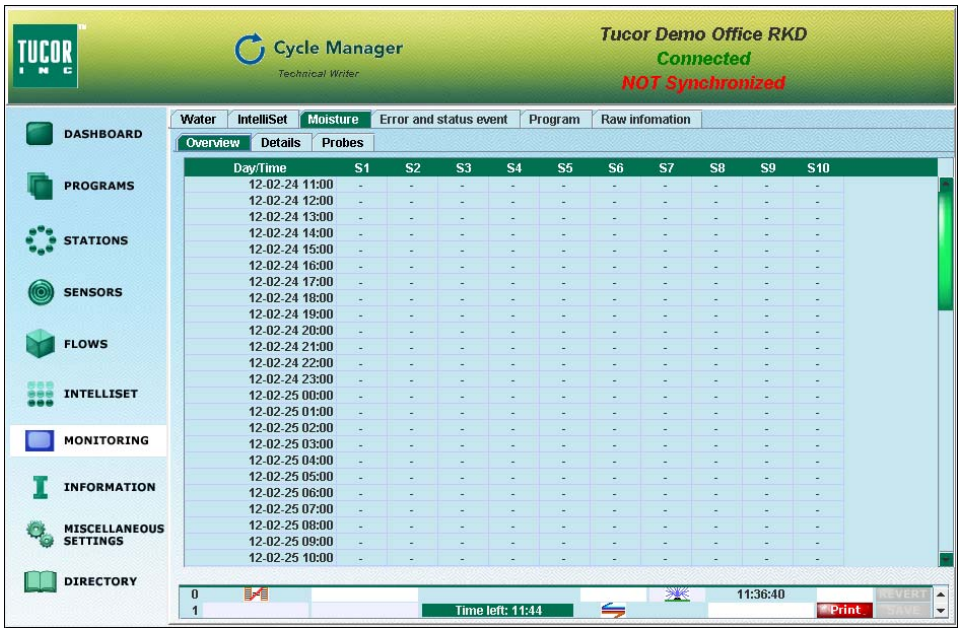


Figure 34: The **Overview** subtab provides basic information about sensors and probes.

Details subtab

The **Details** subtab provides further information about moisture sensors.

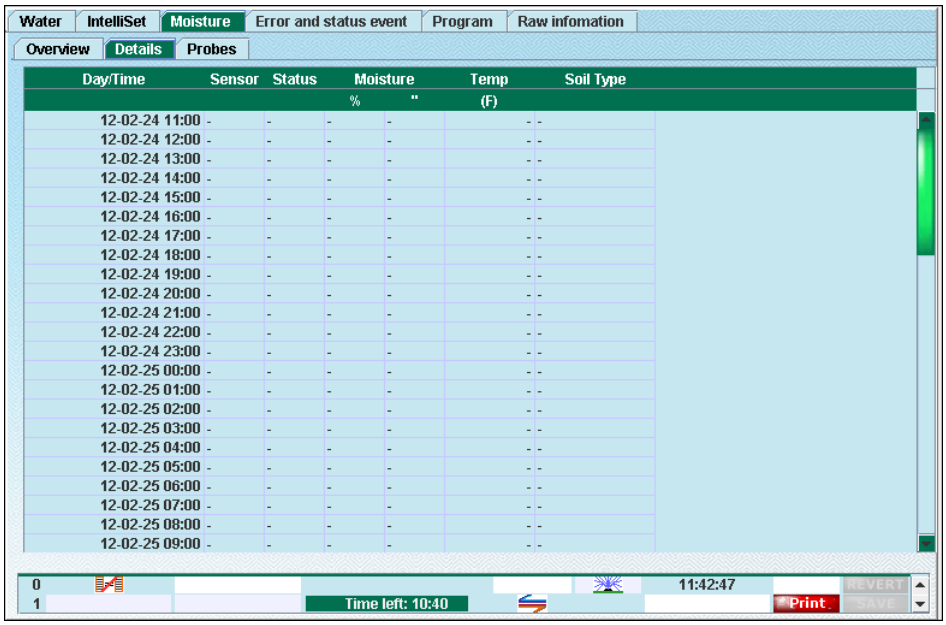


Figure 35: The **Details** subtab provides further information about moisture sensors.

Sensor Shows the number of the sensor. Both normal sensors and probes will appear.

Status Indicates the status of the sensor or probe. Options are *OK*, *Fail*, *Alarm*.

Fail indicates a lack of communication with the sensor.

Alarm indicates that a threshold has been violated.

Moisture	Shows the percentage humidity figure (%) for the current sensor. If you indicate a root zone for the sensor using the IntelliSet tool, you will also see the corresponding water amount in inches ("). For more information, turn to Chapter 8: Managing ET and Moisture.
Temp	Shows the temperature (in Fahrenheit) of the current sensor.
Soil Type	Shows the type of soil in which the sensor is operating. Options are *Sand*, *Clay*, *Loam* and *Standard*.

Probes subtab

The **Probes** subtab exclusively provides additional information about probes in the system. The hourly humidity value in percentage will appear for each measuring point in a probe.

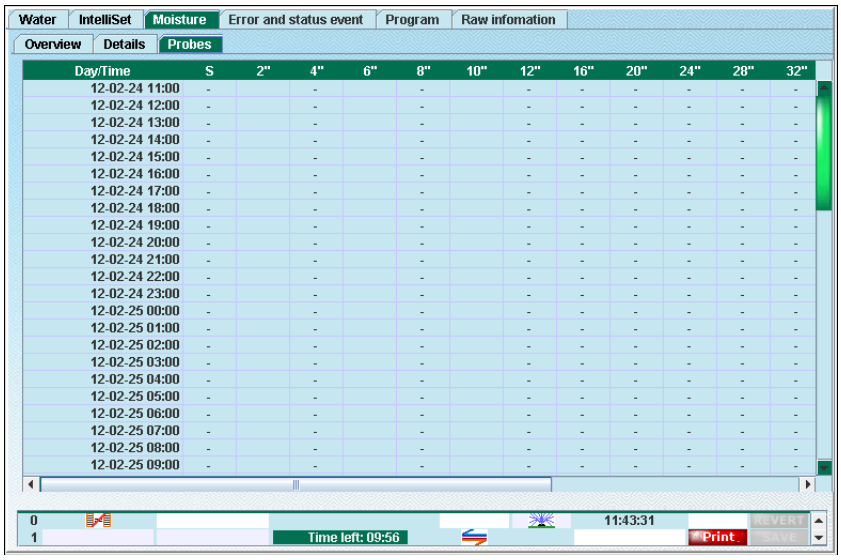


Figure 36: The **Probes** subtab provides humidity information for probes in the system.

Monitoring Programs and Stations

The **Program** tab shows key information about the irrigation programs and stations that have been running. Information date back for a limited period of time.

The **Program** tab is divided into two subtabs: **Overview** and **Details**.

Use the **Overview** subtab to get a quick status, and then – in case of problems – consult the **Details** subtab to get specific information about station and program performance.

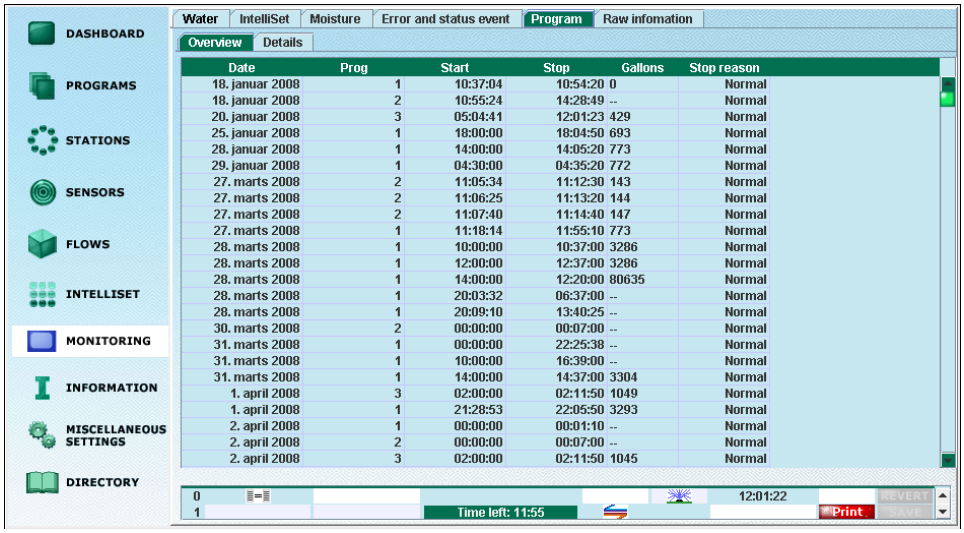


Figure 37: The **Overview** subtab of the **Programs** tab lists basic information about station and program performance.

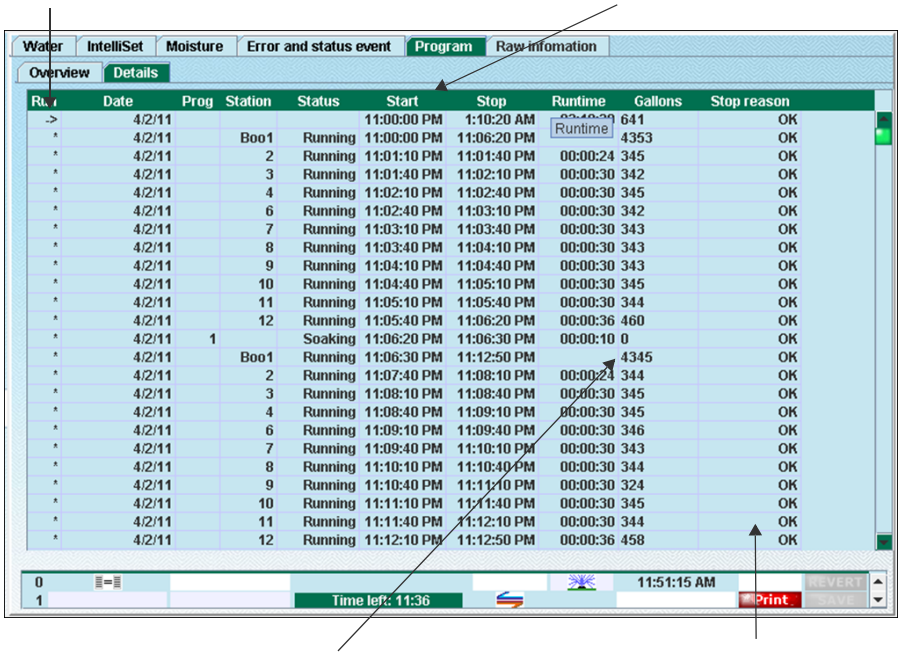
Date	Shows the date the program was running.
Prog	Shows the number of the program.
Start	Shows the starting time of the program.
Stop	Shows the stopping time of the program.

Gallons shows the number of gallons of water irrigated by the program in the running period.

Stop reason The **Stop reason** column shows information about how and sometimes why a program was stopped. Use this information for trouble shooting. Options are *OK*, *Fail*, *Cycles not ended*, *Non-water window*, *Stopped by operator*, *Alarm*, *Max Programs*, *Max Stations* and *Mode change*.

The small arrow at the **Run** column indicates that at this point the program was started.

Columns such as **Date**, **Prog**, **Station** and **Status** provide basic information on stations and program**s.**



At the end of each program or cycle, the **Gallons** column will show the total amount of water accumulated.

The **Stop reason** column shows information about how and why a program was stopped. Use this information for trouble shooting.

Figure 38: Consult the **Details** subtab to get specific information about station and program performance.

Monitoring Error and Status Events

The **Errors and status event** tab shows a wide variety of monitoring information relating to the performance of your system.

It is beyond the scope of this manual to present all errors and events possible. For a full list of event types and values, please contact your Tucor contact.

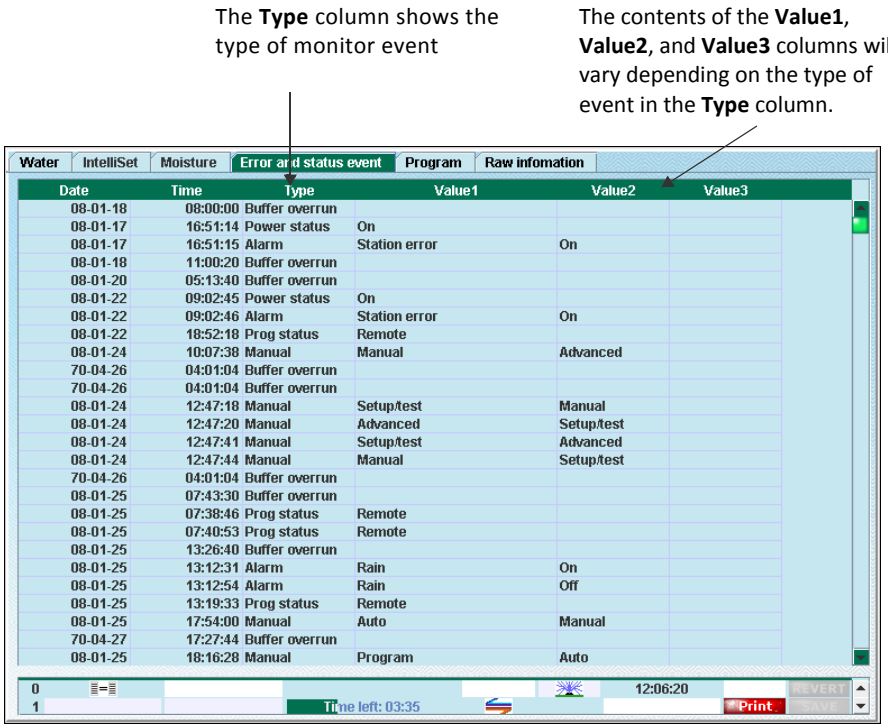


Figure 39: The **Error and status event** tab.

Monitoring All Data

The **Raw information** tab provides access to a series of subtabs with unfiltered controller and weather data. The following subtabs are available:

- Operation – presents relevant information about system performance
- Misting – presents all available information related to misting.
- Water Usage – presents all available information related to water usage.
- Alarms – presents all available information related to rain alarms.
- IntelliSet – presents all available weather station information related to ET and rain.
- Miscellaneous – present various information, such as ...???

The **Raw information** tab and its sub-tabs provides access to all available controller and weather station data.

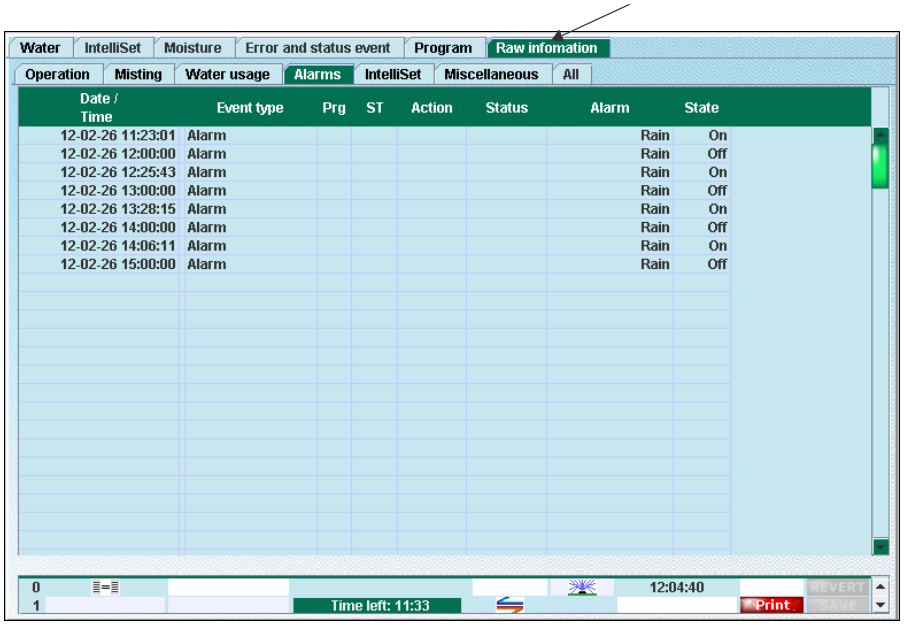


Figure 40: The **Alarms** subtab of the **Raw Information** tab.

Index